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ART. VI.—*On the powers of Tartar Emetic in* [illegible] *relaxation of soft parts during Parturition.* By [illegible] SHANAHAN, M. D.

Rigidity of structure either of the external pa[illegible]ra tion, vagina or os uteri, and whi[illegible] they may have [illegible] congenital, the effects of [illegible]ration, cica[illegible] the induction of inflammation from frequent and [illegible] examination, having met with many such cases whil[illegible] in 1830, and Lecturer on Midwifery, &c. to the Lying-in-hospital [illegible] send street, Dublin, and having in many instances [illegible] satisfied with the effects of bleeding, for though in a ce[illegible] degree relaxation was produced by the abstraction of bl[illegible] it often occurred that the powers of the [illegible]s were incapa-ble of overcoming the remaining resistance [illegible] Instrum[illegible] aid was most generally resorted to,—having seen natur[illegible] der such circumstances attempt her own relief by sponta[illegible]s vomiting I resolved to try the effects of causing vomiting by means of tartar emetic. The mode of administration was merely taking a couple of grs. of tartar emetic, and dissolving it in two ounces of water; half [illegible] mixture to be given to the patient at first, and if it did not produce free vomiting the other half in forty minutes. The first case was one of a very extraordinary nature, and the circumstance occurred during the session of 1831-32. A young woman [illegible] about [illegible] years of age applied to [illegible] attended at her own ho[illegible] commencement, and in accordance with her wishes [illegible] hospital were sent to attend her togeth[illegible] they having remained twelve hours w[illegible], and on examination found that the orifice [illegible] preternaturally contracted and extremely rigid, [illegible] merely sufficient to permit the intr[illegible] little [illegible] I ordered the tartar emetic as before [illegible] and [illegible] that I would call in one hour. On my return the gentlemen in attendance were much amazed by the effects of the e[illegible] the parts being now fully dilated, and the action of the ut[illegible] powerful [illegible] in one hour and a half from the administration of the tartar emetic, a very fine living child was expelled. In the course of my daily visits to this case I took an opportunity of speaking to her husband on the subject; he told me that he never was able to penetrate the structure. Since then I have again attended this woman [illegible] confinement, and though the contraction had partially returned to its former condition, the same mode of treatment was found equally beneficial. With females in first labors who are muscular, and in whom rigidity of the soft parts exists, tartar emetic will [illegible] found eminently useful; nor would I have been induced to make this statement merely from that case, but having repeated the experiments in several instances with similar success. I have since the year 1832 up to the first of February 1837, solely directed its use in rigidity in several hundred cases, with private patients and likewise hospital cases, with varying success, and not in a single instance was my opinion [illegible] effects lessened. Tartar emetic given with the intention of [illegible] vomiting will be found capable of causing general [illegible]ion not solely of the genital organs which become ductile sec[illegible] quantities of lubricating fluid [illegible]ut the skin moist bed[illegible] [illegible]h perspiration; [illegible]action setting in after the [illegible]iting, the [illegible]wers of the uter[illegible] [illegible]co[illegible] [illegible]ore powerful and little resistance now bei[illegible] given [illegible] the s[illegible] [illegible] child is rapidly expelled.

N. B. The use of tartar emetic since the a[illegible] period, when I first mentioned it in my lectures, has been very generally adopted in Ireland, and the reports of many judicious practitioners fully agree with my statements and the treatment of rigidity of soft parts as inculcated at the several schools of midwifery is now in accordance with the doctrine taught by me for those years back. Spontaneous vomiting where occurring to a violent degree, either in the earlier or later months of pregnancy must be looked on by the practitioner as a disease which will cause, I have no doubt, either [illegible] or premature labor; and the irritability that exists during the earlier months pregnancy appears t[illegible] a wise provision of na[illegible] [illegible]endering the u[illegible] with [illegible] [illegible]ment and therefore n[illegible] capa[illegible] [illegible] the uterine vessels.

Art. VII.—*Correspo[illegible]nnected with the Topography of Calcutta and i[illegible]ty. Communicated by F. P. Strong, Esq. Civil Surgeon, Calcutta Sudder, &c.*

[illegible] Smith Esqr. Member Medical Board & Presy Surgeon.

In answer to your circular of July 29th forwarding for my perusal a letter from the Secretary to the Medical Board to your address, expressing the desire of the Board to afford every practicable assistance to such gentlemen as may be engaged in drawing up Topographical accounts of stations in your division; I have the honor to forward copies of several papers, written some years ago, upon this city, its suburbs, the salt marshes, and the Sundarbans south-east to the sea; and to which I have added notes in the margin in further elucidation. I also have annexed other papers more lately written, bearing upon

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the same subject, and a letter to Lord William Bentinck written by a committee which was formed of gentlemen in the suburbs in consequence of my first communication upon the subject in 1828. A small map shewing the bearing of the different parts alluded to is appended, in which Mr. Tassin has, at my request, painted the salt lake of a bluish color, and the low thick salt-water jangal, between the further end of the lake and Tarda, green; while he has represented the lands granted to various persons towards the end of the year 1829 and in 1830, in yellowish green color; to shew their position, the line drawn with carmine points out the new eastern canal, the purple shews the old route by Tolly's Nullah, and the orange shews the route by channel creek. This is a map made only last year, and is not the map I allude to in my papers for further information. There is a large one of the lake and Calcutta by the late Captain Prinsep, giving the levels also; and there are other larger maps by Tassin, of Calcutta and the Sundarbans, shewing all the individual grantee's grounds, numbered, and pointing out the new eastern navigation, projected, and partly carried into execution, by the late Major Schaleh, in a more particular manner than this small map will admit of. One of the letters annexed will shew that I was called upon by the late Governor General Lord William Bentinck to attend a committee at the Government House upon the subject of draining Calcutta, and the drainage and filling up of the salt-water lake. The committee was composed of fourteen gentlemen, and His Lordship alluded to his own experience in such matters having induced him to call this meeting, in order that it might be continued by his successor, and mentioned his communications with the Court of Directors, and their assent to his views in the affair of draining the lake. The committee was to meet again, but His Lordship's illness prevented it, and the subject appears to have slept ever since, except that the public prints have occasionally thrown out the views of different writers interested both for, and against. His Lordship had his own plan for draining the lake printed, together with that of the late Captain Prinsep, and his questions to that gentleman and the answers thereto. There were also some other papers annexed to these, bearing upon the subject, all of which I gave to Sir John Grant, who has given them to Lord Auckland. They are interesting as connected with the subject of my papers, and should I be able to obtain a copy from the Military Board, or elsewhere, I will send them to you. I would add, that when I first waited upon the Governor General, no part of the eastern circular canal had been commenced upon, not a hoe had been applied to the ground, nor had a tree been felled; and I then understood, that although the whole ground

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had been purchased by Government for the entire line of the new eastern canal, from its entrance from the Bágh-bazár floodgates, to the old Entally canal which runs into the lake, yet, that some obstruction, or difficulty, presented itself to this improvement being effected. Viewing this as the nucleus of all improvement with a view to effect a healthiness in this city, I took with me a map of Calcutta, with the projected canal drawn out in pencil, the more clearly to point out what I conceived of the utmost importance, and I was gratified to find that His Lordship took the same view of it that I did, and acted upon it, though I was given to understand that he met with considerable opposition; it is now however finished, and has been so for some time, there is considerable traffic upon it, and the monthly tolls form a considerable item of profit, although the failure of the mercantile houses has materially deteriorated the value of the ground Government have to dispose of on each side of this canal. It has six suspension bridges over it, and a pucka road on its western bank.

The first paper marked 1828, may be considered entirely topographical, and was written about the time that I addressed the Sudder Nizamut Adawlut upon the general unhealthiness of the suburbs of Calcutta. I informed the Governor General that I had made such a report in my official correspondence with that Court, and I found afterwards that my remarks were recommended to the attention of the Governor General in Council. This led to a communication with the magistrate of the suburbs, and 24-pergunnahs, then one district, bringing my report to his notice, and desiring his attention upon the subject; he immediately put himself in communication with the Entally committee, and some time afterwards Mr. John Master, the magistrate, shewed me a plan of his own for the improvement of the suburbs, and the sites were marked upon his map of the 24-pergunnahs, where he proposed to have large tanks excavated, and roads made. Besides this, the Entally committee had several interviews with Lord William Bentinck, and gave into His Lordship's hands, their plans of improvement, of which the letter I have alluded to and annexed, forms only a part; they also gave in maps of the jangals, roads, and grounds generally, and the then price of the land, &c.; sites for tanks were I know fixed upon and marked: but His Lordship went up the country, and nothing has been done.

The second paper was written some months afterwards, and may be considered as departing in a small degree from strict Topography, since I have intermixed the subject of soils, and of boring for water, agriculture, &c. but as regards the proper formation of tanks, the draining off of water, and wells, perhaps

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these subjects may be considered admissible as regarding public health. The new canal had been begun, and was rapidly going on, and that work threw some light upon the general nature of the soil, and confirmed the opinion given by Sir Hide East, that the dampness of the climate was not to be attributed to the moist nature of the soil, which was thought by some to be full of springs; and it also confirmed his opinion of an ancient forest having in former times existed much below the present surface of the earth, which however may have been forced by torrents to their present position, as numerous and large trees were every where met with, many of them in an erect position*. Such was also found to be the case in the new canal made by Major Schalch, running eastward from the other end of the lake at Bamonghotta to Hassingabad, some of the wood had arrived almost at the state they call lignite. Most other parts of this paper are essentially topographical, and point particularly to facts, and to unhealthy localities, and although towards the end of the paper I have advocated particularly the growth of cotton in the Soondurbunds, as well as coffee and sugar, I do not like to separate or divide the paper, for I advise the measure as a main means of reducing the jangal and forest, and consequently of reducing malaria. And if my third paper should be thought to give a long detail regarding boring, it yet shews the exertions that were necessary on my part to keep the experiment going; and we have now attained a depth of upwards of 400 feet, well tubed with cast iron, and the operation is going on with spirit. My further remarks advocating the cutting down the Sundarban jangals will, I hope, though a little lengthy, be pardoned as tending to produce a more healthy state than at present exists. I fancy myself further borne out in not selecting parts only of these papers, or altering their original diction, from the "sketch" of a plan for memoirs on medical topography sent round with the circular by the Medical Board to guide us in some degree. I there see seas, rivers, lakes, wells, morasses, bogs, and canals, noted as points on which the topographer should bestow considerable attention, as they so materially affect

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* The superintendent, a very intelligent native, informs me that in the canal beyond the lake the trees were many of them very large, and were found in the greatest number about 30 miles beyond the lake near Hassingabad; many were very rotten, the rest were used for burning. Among them he recognized the soondry, the byen, the gouah, and other forest trees; their trunks were of all sizes, and he supposes that along a line of 30 miles they were in number from 5 to 15 in a mile. As to the depth of such trees those I saw in the nearer circular canal had their roots about or somewhat below the bottom of the canal, and I saw a large tree about the same depth in a tank digging on the borders of the lake: the workmen said this was a jack tree.

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the dryness or moisture of a country. The deposits, animal, vegetable, and mineral are also mentioned, and among several other matters which I had touched upon, I find evaporation of surface, and vegetable products mentioned, and an allusion to the comparative healthiness of the villages in the Netherlands, as ascertainable by the inspection of their wells; and the state of agriculture, and population, being also mentioned, makes me hope that I shall not be blamed for not leaving out what I have said of Baron Humboldt, and also of the campine of Brobant in the Netherlands, and the ~~late~~ man's remarks upon the same; and I need not apologize for what I have stated from Macculloch's work on the prevalence of epizotic diseases appearing among cattle, at the noted seasons of epidemic fever among men, because I find in the "sketch" circulated by the Board that that is a subject that should be inquired into by the topographer. Indeed, I should have found a difficulty in making any alterations in my papers.

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It will be seen in the accompanying papers I have alluded to Mr. Martin's paper on the medical topography of Calcutta and its suburbs, but there is one part of it which I have omitted to refer to, but which as surgeon to the suburbs, and 24-pergunnahs, I ought perhaps to notice. Mr. Martin suggests that the police surgeon should report upon the state of habitations, sewers, streets, roads, tanks, &c. and that he "should also report *minutely on the state of the suburbs.*" The late Dr. Vos, the then Police surgeon, in whose opinion, as to the necessity of improvement in the suburbs I fully concur, was accordingly called upon by Mr. Martin for his sentiments. Mr. Martin was not I believe aware that my duties as surgeon to the suburbs, had not only brought to my attention the importance of the subject, but had induced me, at an earlier period than the date of his papers, to make the repeated reports detailed in the accompanying papers. I merely allude to this, as any person reading only Mr. Martin's papers, might be led to infer, from the suggestion to extend the duties of the Police surgeon to the suburbs, that the surgeon of the suburbs had omitted all notice of the obvious causes affecting the health of that portion of the district under his charge, whilst in reality, it has not been for want of representation of their bad effects, that the various causes of unhealthiness in the suburbs have been allowed to exist in their full vigor until, as I am glad to observe, they have at last attracted the notice of other medical officers besides myself. Finding that the printed papers advocating the fever-hospital, &c. were in circulation, I forwarded to the Government the three first of the accompanying papers, and that upon the effect of the inundations, and I received from Mr. Mangles

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an answer, that my opinions would not be overlooked when the matters to which they relate came under the consideration of Government. I annex a copy of the correspondence for your information.

The fourth paper which I admit to be rather rambling and irregular in its character, was written, as far as I can recollect in 1830, at the request of the late Captain Herbert; and is in continuation of some papers I had already given him upon the same subject, but which had relation more particularly to the city and native town of Calcutta, also including the lake and Sundarbans; but Captain Herbert required further information respecting the suburbs, the filthy state of them he thought was the more immediate cause of sickness here. He said he considered that in these parts, there was not sufficient space to breathe, without inhaling disease, and that the luxurious growth of vegetation every where existing among the huts and villages, produced the malarious atmosphere, which not only influenced the suburbs but extended its effects to the city. He intended to have published his opinions in his Gleanings in Science, as remarks on the Malarial Topography of Calcutta and its neighbourhood. Indeed he had begun this paper, and had considerably advanced in it, when his departure from the Presidency caused him to transfer the work to other hands, and he then gave up his paper upon malaria.

This paper or memorandum is copied from a rough paper intended simply as a skeleton for Capt. Herbert to build upon; loosely written as it is, it may not be irrelevant to the subject of topography, as it contains some allusion to facts, which may not be altogether useless.

All the above papers were written seven or eight years ago, but the next paper, or letter, which, although long, is a question altogether about climate, was for the information of the Commissioner of the districts contiguous to Calcutta; and in answer to an inquiry issued on the part of Government, endeavouring if possible to select the more healthy from the unhealthy districts, with a view to send prisoners who are banished, to those districts that are found to be the most healthy. It will be seen in this letter, that I enter upon the subject with as much care and attention as I can command; the subject was a difficult one, and it was an answer to a circular which was addressed to all the other civil surgeons as well as to the magistrate; and the commissioner informs me that my letter was the only one of all those he received that he had forwarded to the superior court, the Sudder Nizamut Adawlut, and he said he did so, because he thought it contained a good deal of useful information; such being the case I hope I shall be pardoned for forwarding it to you on this occasion.

Perhaps the health of prisoners in a district may not be altogether a very bad criterion of the healthiness, or otherwise of a district. The question had reference to banished prisoners and those in the Allipore jail being all banished prisoners and for life also, induced me to make a comparison of the mortality among them for a series of years. I found the average mortality little more than 5 per cent. which considering that every man must die there, the proportion did not appear great. In cities and other places, and departments as in the army with a regiment, or in other services, they retire, become pensioned or otherwise quitting, leave the field for others, and do not remain to swell the mortality ; but in this jail where men many of them coming in advanced in age are located for life, a larger mortality ought to be expected than among other bodies. I therefore come to the conclusion that it is healthily situated, and it will not appear inconsistent with my opinion expressed in the former letter, as to the general causes of unhealthiness, because those causes are obviated in this particular case. The jail is in an open space clear of jangal, and these prisoners are free to breathe good pure air in the absence of all jangal, filth, bad water and other nuisances of which I complain as affecting the suburbs generally. The air is clear, and the jail tank probably the best of any, either in or near Calcutta ; and I think it is an instance which goes to prove the correctness of the opinion of those who see sickness and death produced by malaria where it is allowed to exist ; as for instance, in the character of the diseases and death which I allude to in the margin of my second paper, in the case of Prince Sooroodeen who allowed jangal to grow up to his very doors at Russapaglah, and whose continuance of life for several years was a source of surprise to myself. It may be that the quantity of Opium he took may for a time have counteracted the poison of malaria which killed his only two sons when infants, and spread disease among his domestics. The Mr. Ward I allude to in the margin of the memorandum for Captain Herbert, is another strong instance I would add in proof, and in addition to the facts and localities I point out in my earlier papers, I am sorry now to add another case to swell the list of mortality arising from the same cause. In all other respects, a most intelligent native doctor who had been in my service for nearly twenty years, could not be made to understand that his continuance in his family house at Bhawanipore surrounded by malaria would be the death of him. I often so assured him, and took the greatest pains for a year or two, but all without effect ; an old jangal piggery inhabited by chumars and pigs was the place of his residence, and his diseases were first intermittent and remittent fever, dysentery, spleen, and he died dropsical.

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The Allipore Jail I consider to be situated in the healthiest part of the suburbs, and the whole of Allipore being perhaps somewhat higher, and better drained, or from the nature of its soil, which is sandy, does appear to me to have advantages over all the other suburbs if perhaps the open and airy part of Balleegunge be excepted. If I am rightly informed, the inundation of 1833 which produced sickness in every house in Garden Reach, had not any serious effects either in the open parts of Balleegunge, or Allipore, while all the inhabitants of the rest of the suburbs were considerable sufferers, and great mortality was produced among the native population of those parts.

The consequence of this flooding was felt even in the city, for by the Police reports the mortality in 1833 nearly doubled that of the preceding year, no doubt increased by the vast number of the 24-pergunnahs sufferers, both rich and poor flocking into the city, turned out of their habitations by the floods, and arriving also for medical aid, as I have remarked in my paper upon the subject written just after the inundation. The soil of Balleegunge I have found by the borings I have made there to be very sandy, (indeed the place takes its name from bálú or sand, which is highly calculated to carry off or absorb superfluous water; and I would here remark that the lands to the south-east as far as Gurriah-haut, and very far beyond that place are an open plain, and occasionally with the exception of garden cultivation, cultivated with rice or tobacco, to the extent of many miles, say twenty; and it is only here and there that villages are to be seen, and these at a great distance from each other. It appears to me, and I wish to press it upon the minds of those who consider this subject, that the malaria Calcutta has to complain of is very greatly, although not entirely in the surrounding crowded villages and more particularly those to the eastward between the Salt Lake, and the Mahratta Ditch, for admitting what now seems to be uncontradicted, that this lake is highly productive of malaria—the air, when the wind is eastward of us has to find its way to our city, only over swamps, jangals and villages themselves highly productive of the same malaria, and therefore not calculated to dispel the evil. The advantage enjoyed by Calcutta when the wind is south, is that it passes over a large tract of country with very few villages; besides which there is the fine maidán south of the city to neutralize what malaria it possibly may contain: a similar remark may be said to apply in some degree when the wind is in the north,—and on the west the river is some safeguard, but the eastern is notoriously the bad wind, and I think here it is sufficiently accounted for.

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Should the researches now making tend to a better knowledge of these facts, some attempts at improvement may commence. Very slow and gradual improvements have no doubt, been adopted by the few Europeans and others of intelligence, who have at different periods inhabited our eastern suburbs, so much so, that among Europeans life is much more safe than it was half a century ago, when we know from well authenticated records that the mortality was frightfully great, and we find the Salt-water Lake recorded as the most prominent of the causes. Should cleanliness ever obtain in these Eastern suburbs and the Salt Lake become drained and cultivated, I entertain no doubt whatever of great healthiness being the result; and one great advantage attending the drainage of the lake would be, that the country between it and the city would immediately improve, become more valuable, and be the resort of a more respectable population.

However malaria may be generated, there can be no doubt that it is produced most abundantly in all those parts of Bengal which are not cleared of jangal, drained, and kept clean. Within my recollection the maidán south of our city was more swampy, and covered with a coarser grass than it now is, and many parts of the native town, and Chowringhee, are much improved, broad roads and squares having been made, and it is quite obvious to me that fevers and diseases in general are by no means so common as when I commenced practice here; I am so certain on this point, that I will not waste time by entering into particulars. Further drainage and more free circulation of air will still farther improve the public health, and it is admitted on all hands that attention and improvement in our city drains is indispensible to effect the good desired.

Yet, I think we must look to the improvement of the surrounding suburbs, and lands beyond, effectually to render this city as healthy as it can be made; and without attempting to investigate the chemical analysis of malaria, or to describe what medical treatment should be adopted for diseases produced by this poison, I will endeavour to draw attention and point to the numerous causes existing all around us.

Let us look around us, and we find all the essentials necessary for the formation of malaria; beyond our city jangals, lakes, marshes, gardens crowded with trees, and woods of every description, and weeds, stagnant water, filthy pools, and low grass jangals of every kind surrounding the villagers' habitations. In these exist ample means for a constant supply of the poison, assisted, as they are, by the natural heat and moisture of the climate; but when unnatural or meteoric changes of climate take place, or when unnatural inundations of sea, or river water

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occur, then, as we should expect, we find disease and death scourge the land, as was instanced by the inundation of 1833 in particular, and as shewn by all the other* inundations also. Such excess of mortality is to be expected in Bengal when inundations, or unusual moisture followed by great heat occur. As a common cause of the constant malaria that prevails here I would mention the exposure of a vast expanse of wet mud on the receding of the tide from the Salt-water Lake, and the banks of the rivers, and tide harbours—it would not be difficult to enumerate more causes, but the above are sufficient. Within the city among numerous other causes we find sewers and drains sadly neglected, allowing their decomposed and decomposing animal, vegetable and other substances to sink into the earth, instead of draining off as they should do into the river or the circular canal. Here perhaps in some particular state of the ground, the soil may be of a nature calculated to receive the poison, and it probably condenses and accumulates, forming as it were, a permanent attachment to the spot, and for what we know, certain peculiar solid bodies casually exposed to it, may receive it also, whether the poison be produced by common putrefaction, or by any peculiar change in the elements of vegetable matter, dead or dying. It seems to be admitted that we know not its exact chemical character, though it is acknowledged that it is produced and propagated by wet soils, hot countries, a particular state of atmosphere and high temperature, and with this knowledge we do possess power to control and check to a very considerable degree this extensive cause of mortality. We know by authentic records that it is but little more than a century ago when London, from its then filthy state and bad drainage, was subject to very great mortality, and as civilization has advanced, the countries as well as the cities in Europe have also improved in healthiness.

Dr. Bisset Hawkins describes in his work lately written on medical statistics, that mortality has diminished in nearly the same degree, in which the prosperity of these countries has gradually increased. In England and Wales for instance, the annual deaths were, in the census of 1780, so numerous as 1 in 40. In 1801 they were 1 in 47. So in France (a more malarial country it might have been remarked) the annual mortality was, in the year 1781, 1 in 29, and in 1802 1 in 30. In London he considers that now, 1 person in 40 dies annually, while he gives the mortality of England and Wales at the present time 1 in 60, a considerable improvement since the year 1780, when it was 1 in 40. Doctor Hawkins gives the mortality of various continental cities, and compares them with the

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* Those of 1831, 1832, and 1834.

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country mortality, which it exceeds in every instance. He remarks that mortality or the calculation of the number of deaths which occur in a country, or town, has become an important object of research; and that tables are formed in almost every civilized state by direction of the Government in order to ascertain the point.

In some districts this amount is increased, or diminished in a slight degree, by direct, and by local causes; but on the whole, it appears that the good or bad condition of a people, the possession of the necessaries of life, or their absence, mildness or rigor of the mode of Government, the advance or retrogression of knowledge, are the principal circumstances which influence the result. The greatest difference of mortality in city and country, appears in Holland, where in Amsterdam the deaths were 1 in 24, while in the country it was 1 in 48. In the city of Naples 1 in 28, in the country 1 in 35. In the city of Paris 1 in 32, in France 1 in 40. I may be allowed to quote Dr. Hawkins' concluding reasoning upon this important subject, "Life and death, then, mainly depend upon the prosperity of the circumstances which surround us: physical prosperity and moral happiness, which often depend, and re-act upon each other, present a safeguard at every crisis of existence both to individuals and to nations. We may often judge with tolerably accuracy of the mortality which is likely to exist in any given country, town, or hospital, from the degree in which poverty or wealth, knowledge or ignorance, misfortune or success, are seen to prevail; wherever want and misery exist, there the mother is more likely to die in labor, there still-births will be more frequent, there the deaths during infancy will be more numerous, there epidemics will rage more violently, there the recoveries from disease will be more tedious, and the fatal termination of it more probable, and there also will death usually approach at an earlier period of life than in happier situations." It will be seen in the statistical account of the British empire just published by J. R. Macculloch, Esq., under the head of vital statistics, that between the years 1813 and 1830 he calculates the annual mortality in London at 2.84 per cent. and for six towns in England for the same number of years as at 2.95, and he estimates the mortality at Glasgow between the years 1821 and 1835 at 2.83 per cent., whilst he gives a detail of Wales and forty counties, shewing in every instance a considerable decrease of mortality as compared with London, Glasgow, and the six towns above cited. The above mentioned book has numerous tables upon points of mortality, and contains other information upon the same subject of great interest.

With regard to this part of India, I mean to confine myself to Bengal, I think the reverse of what occurs in Europe as to mortality will be shewn when we obtain statistical reports that can be relied upon, and whatever may be the healthiness or otherwise, of the other Bengal cities, I expect it will be found that in Calcutta there is less mortality than elsewhere generally in Bengal, though it cannot be expected that we should shew so small a mortality as exists in the city of London or the other European cities.

In England and Wales the poor are taken care of in workhouses, and the sick poor receive good medical and surgical advice and attendance in hospital; but in India where the knowledge of medicine and the healing art is the same as it was many centuries ago; where in place of a sympathetic feeling for his fellow-man there not only prevails an apathy in the Indian character, but where a division of caste prevents the agency of good will and assistance of one towards another; where insufficient clothing, bad food, bathing at improper times, and the practice of fasting for long periods, (adopted both by Musalmáns and Hindus,) and where the Hindu ceremony of Antarjalí, which is so general,—taking the sick to expedite their death upon the muddy bank of the Ganges—prevails; added to all this, the want of advance in civilization and knowledge, and taking into view the extensive sources of malaria so much dwelt upon, the existence of which I conceive must in a great measure proceed from the want of knowledge and advancement in intelligence above alluded to, we must naturally expect to find a greater mortality here than in Europe.

The housing and habits of the Bengálís which I have attempted to describe in the 9th paragraph of my letter to the Medical Board, dated March 21st, 1835, all seem to have a tendency to deteriorate and shorten life. The diseases of Bengal are nearly all produced by malaria, and bear a very strong analogy in character to the diseases formerly prevailing in European cities and countries, in times more uncivilized than the present. Sydenham speaking of those times, says, Cholera comes almost as constant at the close of summer, and towards the beginning of spring, as cuckoos towards midsummer. He closes an accurate description by remarking, that it "often destroyed the patient in 24 hours." Dr. Craigie has demonstrated the antiquity and identity of cholera all over the world. The description and remedy for cholera taken from the work of Hermannas Vander Heyden, a physician of Ghent, dated 1653, published in the 1st vol. of the Gleanings of Science, I myself sent to the author in 1829. The remedy as far as the opium and henbane, hyoscyamus or the Khorásání ajwáyan is concern-

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ed, I can speak of myself most favorably from extensive experience. The author remarks that the taking of it (the remedy) is not to be deferred so long, as that the patient is fallen into convulsive fits, and his excrements are of the color of whey, which are evident signs that nature is spent in him, for then it must be taken with all speed, &c. Fevers remittent, intermittent and anomalous, with cholera, diarrhœa and dysentery, spleen, and all the nervous disorders under the head of neuralgia, are the prevailing diseases both among the rich as well as the poor natives of this country. We find the bábus of both Calcutta and the Mufassal passing through a life of disease and misery, and dying early in life, somewhat similar to our European barons of old, who are said seldom to have attained to an advanced age, the filthy moats surrounding their castles being supposed to have been the main cause ; so here I have often had occasion to remark in and about houses of opulent natives, causes sufficient for all the mischief alluded to.

In conclusion, I will add some tables of the census of Calcutta lately taken, with the mortality of the natives for the last five years taken from the Police books. Captain Birch began this year to procure the births, so that in future a more correct estimate may be formed. The great difference in mortality between the Hindus and Musalmáns is striking, while the difference to be observed between the Portuguese as compared with the English and the Eurasians is equally so.

Here is much room for speculation, and it can not be said that as yet we have as good means of getting correct information upon this subject as they possess in Europe ; nevertheless, we may approach as near as we can to the point we wish to ascertain, and we may hope to improve in such statistical records. If we are at all near the truth, the result seems to agree with the opinions formed by Dr. Hawkins in his conclusions and summing up upon the subject, just above referred to, and quoted. The Portuguese, among whom so great a mortality is shewn, are a suffering race, greatly subject to the catalogue of complaints enumerated in these papers, while the English and Eurasians are far more prosperous in life, and enjoy comforts and happiness in a very high degree, as compared with the former section of society. The mortality of the former 3½ per cent. per annum, while that of the latter being 12½ per cent. is very great. In 1830 I ascertained, and published in the Gleanings of Science, the burials in Calcutta of protestant Christians from the year 1820, to shew at that time, that although the European population must have greatly increased, yet that the deaths and burials had not increased ; and now that the same population is acknowledged to have increased very

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materially indeed, yet we see upon referring to the first column of one of the tables, giving the protestant burials for the last 20 years, no increase of deaths. The years 1833-4, the two years following the sea inundations, shew the greatest mortality of late years; while among the native population those two years shew an extraordinary mortality. The two last years shew that in both European and Native population healthiness is restored. The mortality among the other columns of sections of society, the Catholic, Greek-Armenians, Hindu-Armenians, and Native Christians, are for the last 20 years, and I believe them to be nearly correct. The Chinese and the Jews keep no account of their burials, I of course could not include them, and they form a small portion of society in this city. The census is the one last taken by Captain Birch, and he took great pains to make it as correct as possible. You will observe by one of the letters annexed that upon the receipt of your circular I addressed the magistrate of the 24-pergunnahs requesting a census of the zillah, together with the mortality, and you will see his obliging answer to the same, the census I send is only of the suburbs division, which forms only a part of the district.

I have, &c.
(Signed) F. P. STRONG,
August 29, 1837. *Surgeon to 24-pergunnahs.*

I find that my letter is defective in as much as I have not noticed what has been done at different times in the suburbs of Calcutta when cholera has been scourging these parts and carrying off all its victims who could not obtain, or who declined medical aid.

It is but justice to the native doctors who are permanently appointed to the different gangs of prisoners on the suburban roads, as well as the native doctors attached to the Mysore princes, that I should state how eminently successful they have been in saving life under these dreadful circumstances, and this has been a work they have at such times performed, independant of their actual duties. I think I may say that taking the average of several years, the mortality among villagers has not been more than 6 per cent. of those attacked with cholera, where the above mentioned doctors, and others appointed temporarily to assist on urgent occasions, were called to the patient in the early stage of the disease, and the average of the last sixteen years gives a proportion of 6⅔ per cent. among the prisoners attacked with cholera at this sudder station. A like favorable result attended the native doctors appointed at Bombay, when the cholera became epidemic in that place, and Dr. Ogilvy,

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the then secretary to the Medical Board of that presidency, remarks that it was not ascertained that any case of cholera had recovered in which medicine had not been administered. 1204 fatal cases of cholera were reported by the Bombay Police, in none of which cases had medicine been given. Should this be the case in all situations among the poorer natives of India when cholera prevails, might it not be considered as a highly to be desired act of benevolence on the part of Government, that native doctors should be permanently fixed at different points? Say one, or two, with a supply of medicine at each thannah, immediately to render assistance in case of any illness, whether fever, or otherwise, for although it is possible that every case of cholera reported as such, may possibly not be actual cholera, yet it probably may be a formidable disease and would be immediately relieved; while fever, dysentery, &c. would receive a check, and most cases of cholera would be cured at once. The subject is an important one and probably much better plans than those I have suggested may be put forwards by others and adopted by the Government. I would only here remark, that such remedial measures may be the means of preventing much serious disease, and to a certain extent, preclude the necessity of native hospitals. The natives themselves seem to have a great objection to quitting their homes, and mixing with different classes of their fellow-men

It appears to me that as a means of checking the progress of disease among the natives of this country, some such plan would be found greatly to assist the grand preventive means, the subject of my theme, the removal of malaria.

In the map of the 24-pergannahs which I copied from the map which Mr. John Masters lent me several years ago, will be seen the roads and tanks proposed by that gentleman to be made in the eastern suburbs marked in red ink, and it will be observed that this projected improvement occupies at least half the ground between the Salt-water Lake and the Mahratta Ditch. The improvements recommended by the Entally committee were more extensive.

No. 1, 1828.—On the Topography of Calcutta, the Suburbs, and the Lake and Sundarbans beyond.

In and about Calcutta among the causes of unhealthiness are the number of small dirty tanks, and the large drains from which the water does not run off; examples of these may be seen in every direction, but particularly along the Circular Road, the Baitakhanah Road, and the roads in and about Entally and Siáldah. To these may be added the numerous holes or tanks

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of shallow water which fill in the rains, and stagnate in the dry weather. To remove these causes of malaria, it would appear necessary that the drains should be kept in a clear state, so that the water should run off at once, and as to the holes or small tanks they should be filled up.

On looking at the map it will be seen that there is a great deficiency of *public large tanks** *all along the Circular Road*, and if tanks of a considerable size were dug there, the soil from them might be used in filling up innumerable holes and tanks, and also many ditches which are perhaps of an unnecessary depth and width. A plan something like this, Dr. Martin tells me, was adopted near the Body Guard Lines and his hospital†, with great good effect in lessening the number of sick

* As regards the deficiency of public tanks, I am glad to be able to add the following as a presentment of the grand jury to the judge, signed by the foreman on behalf of himself and the other jurors only the other day.

That the native inhabitants of Calcutta are, during the hot season, most distressed for want of a proper supply of water for domestic purposes, and for the extinction of fires; and that there ought to be at least *six new tanks of water* dug on the Calcutta side of the Circular Road, and the aqueduct from the engine at the Chandpaul Ghaut ought to be carried to each of the said proposed tanks, and also to the seven public tanks now being on the line of road from Sám Bazár to Park Street, in order that the said several tanks may be supplied with water from the river, &c. &c. *August 25th* 1837.

† Mr. Martin in a printed paper on the medical topography of Calcutta and its suburbs in 1834, gives a further account of the body-guard hospital, and improvements the Government adopted at his suggestion. He says —the result during the three following years, was a reduction in the frequency and intensity of fever, as remarkable as it was satisfactory. In speaking of the different villages he says, that one description will serve for all, viz. general irregularity of ground, affording lodgments of various extents for stagnant waters, now very offensive; drainage every where defective, and good tank-water scarce. There are also belts of jangal trees and underwood, obstructing ventilation. In all these villages the replies of the natives confirmed, what indeed any one could have predicted, as to the general prevalence of remittent and intermittent fevers; he adds—it may be said with truth, that of all the places noticed, there are not six square acres of soil occupied by natives which do not contain marsh, and other concentrated sources of periodic fevers which in the course of time establish their inevitable sequelæ of spleen, and fatal diarrhœa—the brief history of the life and death of two-thirds of all the poor inhabitants around us.

I do most cordially agree in sentiment with Mr. Martin, that, without attention to the state of the suburbs in the first instance, it is useless to attempt any great improvement within the city, and he considers that for one case of fever within the city, there are two beyond the Mahratta Ditch. I allude to Mr. Martin's observations and sentiments on these subjects, as confirming those which I had previously expressed in my own papers on the same subjects; and I may add, that the late Doctor Vos in his letter to Mr. Martin's address, says—" The suburbs require much

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sipáhís in hospital. To these causes may be added the great quantity of trees and jangal to the eastward of Calcutta, and indeed throughout the suburbs, and even in many parts of Calcutta itself; much of this exists in the private gardens and compounds of individuals, and is, I imagine, as great a nuisance as it is in towns in England to exercise any unwholesome trade to the detriment of the health of the inhabitants; and as such nuisances can there be put down, so ought the nuisance of overgrown jangal here to be capable of being removed. Much probably arises from neglect, and would be removed without any coercion; example might induce some to remove the nuisance, but there might be others who might require a stronger stimulus than either example or their own benefit. To meet this perhaps a regulation, if necessary, might be framed by Government, which I should think would not be a matter of much difficulty as far as regards the town, and for the suburbs I should hope there would be no difficulty. In the native part of the town the stench of the drains and stagnation of the tanks is a sad grievance. In these filthy stagnant small tanks or puddles, numerous natives bathe, and in these you may see filth of every kind, and I can point to such which produce sickness and death to those who live close to them; the filling up of those holes and making large public tanks would be of essential benefit as regards cleanliness and health*. Almost throughout the native town the drains are generally of a bad

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improvement, and as long as this object is unaccomplished, Calcutta cannot be healthy, it being surrounded with jangal on all sides except the river; the suburbs of Calcutta are full of dirty pools, and no sufficiently large tanks." And he alludes to the continual sickness in most families except those who live in upper-roomed houses.

With the same view, I also refer to the observations made by Bábu Ramcomul Sen and Dr. Jackson to Mr. Martin's address, who remark that the particular causes of fever are:—

1st. Want of tanks in different parts of the native town to supply wholesome water for drinking.

2nd. Accumulation of filth and stagnant water.

3rd. Shallow tanks, with unwholesome water.

4th. Digging pits and holes, and leaving them open.

5th. Drains.

And it is further remarked—in the suburbs of Calcutta the drains are badly kept, water does not find its free passage in them, and amongst crowded gardens, full of marshy places surrounded by jangal, the free circulation of air is prevented, while the decayed leaves and vegetable substances thrown into the stagnant water create malaria, and produce fever; and it is added, that few of the laborers, peasants, and poorer class of people living in the suburbs, escape its effects, and even the higher class of people are attacked with it, and a large portion of them fall victims to it.

* One good-sized tank has since been made in the native town.

kind, and as regards drains, the steam-engine* now about to be erected at the Bágh-bazár, to water the central Chitpore road, might be made available to fill reservoirs that might once a day, or probably twice, cleanse the drains; or it might be desirable to erect more powerful steam-engines for such purpose generally throughout the presidency. The filth of every kind found in most of the cross and small roads in the native town is a great evil added to the rest, and if the chaukidárs or those empowered would oblige the bábus, and those in large houses to remove away their nuisance, it would be desirable. Regulation —— of 1814, enforces this.

The tatties generally throughout the native town of Calcutta, and Chowringhee, are much complained of in all directions, and situations of extreme nuisance on this account are frequently pointed out to me. I have found in the insane hospital the advantage of sinking this nuisance into deep wells†, but improvements of this sort, and of so extensive a nature would rather belong to a scientific surveyor than to a medical man, whose province it may more immediately be to point out these various sources of pestiferous atmosphere, and the same remark equally applies to the general draining of Calcutta.

It is not easy to point out what this miasma or malaria is, but the state of the soil has much to do with it; it is known to be formed in marshy or undrained spots, in wet woods, and in moist meadows; and the low and dense brushwood jangal or thickets of reed or grass, so common in India, being the residence of moisture and decaying vegetation is analogous to marsh lands, and must produce much; but it is well known that Indian fevers are caught also in forests, such as the Turraie forest, and many others, but particularly in a most dangerous one near Hussimabad and one above Bareilly.

I conceive then, that putting out of question the *Sundarbans*, and the *Salt-water Lake*, that the thickets of trees and jangal, weeds, pools, small stagnant tanks, and jheels, which every where abound on each side of the road, down from Chowringhee, Brejeetullah, to the end of Russapaglah, on each side of the Kalighat road, on to Tolly's bridge, on each side of Tolly's nullah, and the road on the right of this nullah as far as the Insane Hospital, where the eye can hardly find any equality of surface except on the jheels and tanks, and where the wild indigo and noxious weeds are growing in all directions—all this being situated south of the presidency, must be a constant source of disease and disorders, many of which would vanish, if this pestilence could be removed. And if I am not mistaken, I can trace illness from this very source (these weeds) to certain houses in Chowringhee where in occasionally uninhabited houses, in the compound, and round the tanks is to be found, jangal indeed, which must add greatly to the malaria which is blown from the Russapaglah jangals over the Chowringhee part of the presidency. I have *as yet* excepted the *Salt-water Lake and Sundarbans*, to confine myself to *Calcutta* and its *suburbs*; but considering the general healthiness of this presidency, they cannot be well excluded, and they have been always considered as conducing to the general unhealthiness of the place, the wind coming over such an expanse of *jangal* and *marsh*. The experience of medical practitioners here confirms this opinion, for it will be generally found, that where easterly winds prevail for some days together a greater degree of sickness is common. To inform myself as well as I can regarding the lake, I have been through it as far as Tarda, and frequently visited its borders by the several roads leading up to it from the Circular Road; the further half of what appears in the map as lake, is now a continued low Sundarban jangal from Bamanghatta to Tarda, intersected by channels; and the same kind of thick low jangal is continued round from Tarda to near the lands adjoining Gurria-haut on Tolly's nullah. From inquiries I have made I understand that the water in what is called the lake, but which may more properly be considered as a mere shallow marsh, is generally not much more than knee deep, and it is in many places of even less than that depth. The appearance of grass and bushes growing in the water shows that it cannot be of any considerable depth, and I am inclined to believe, that the depth of the water generally throughout the lake, is, with the exception of the navigable channel through it, not of greater depth than what I have just mentioned. The water is brackish, but becomes more salt as you proceed from Ballighat towards Bamanghatta along the navigable channel which runs through the lake to that place. No one can doubt that a shallow* brackish or salt marsh, extending as the one in question does, over a surface of many miles†, must be a source of much unhealthiness, particularly in a tropical climate, and that it must produce a contaminated atmosphere, the bad qualities of which must affect the health, not only of those inhabiting its immediate borders, but also

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* A considerable sum was subscribed for this purpose, but the plan was not adopted, the interest of the money being expended in watering the Chitpore road.

† The same plan has since been adopted in the jail hospital at Allipore.

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* Marshes into which sea-water occasionally enters, are observed to be more pestilential than mere fresh-water swamps. Vide Dr. Traill's Medical Jurisprudence, page 88.

† Eighteen and a half square miles.

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those residing in the neighbourhood for miles around it. That the neighbourhood of the lake, is really unhealthy*, I believe needs no proof; inquiry amongst the natives of Balllighat and other places similarly situated, would satisfy any person in this respect. He would be told "the air was very bad," that the "salt air was very bad," and would find, that sickness in those places more than commonly prevails.

I have heard it said, that this lake or marsh was capable of being drained, and the lands redeemed and brought into cultivation; moreover that it would probably become valuable land for the cultivation of indigo, rice, and other products. The question of draining however is one which belongs more to the province of a surveyor to decide, and upon which I am unable to form any correct opinion. The channel which runs through the lake from Ballighat to Bamanghatta, is bordered on each side with grass and jangal, and is the only part of the lake which I understand is used for the purpose of navigation, and this channel is obliged to be kept open by means of dredging boats; on the borders of it, and indeed on other parts of the lake, huts are occasionally to be seen, and cattle grazing in the jangal and grass in the water; here and there are to be met with lumps of earth above the water, and particularly *small ridges in some places along the edge of the navigable channel.* From these circumstances, and from what I have heard on the subject of draining the lake, I am rather inclined to think that something might be practicable in this respect, and I believe there are as yet no grounds for supposing it impossible to drain off the water, or by embankments, or some other means, to reduce the land now waste and useless, and a source of disease into profitable cultivation, and make it at least a comparatively healthy place. I believe that some land bordering upon the lake on the Calcutta side, and to a considerable extent, has already by means of drains and embankments been reduced from its marshy state, and either is, or will shortly be, in a state of cultivation, which is a proof, that industry may overcome any seeming difficulties; and that at least some parts of this pestilential marsh may be brought into a valuable state; and if the whole, or a considerable part was reduced into cultivation, even into paddy or rice

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* Some years ago 16 police peons were sent upon a particular duty to the borders of this Lake—every one of them became ill; as many more men were sent in their room; and these were all attacked with disease and obliged to return.

My informant was Mr. Blacquiere who saw these men. It has been said that if the lake was converted into a rice cultivation, it would be as unhealthy as it now is. Quere, Would a double batch of men sent to a rice cultivation become thus diseased?

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lands, the situation would become much more healthy, and the whole neighbourhood, including Calcutta, would be much benefited by it. It is true, that as paddy or rice land it would still at certain seasons be partially under water, as lands of that description generally are, but I do not think that such lands produce the same unhealthy atmosphere as the present salt and jangal marsh now does, though they may do so in a comparatively small degree; the crop is cut down and not allowed to rot on the ground, or in the water, as the jangal does, and the land is clean for many months in the year. If by general draining, levelling, removing the neighbouring jangal, and producing as much as possible a free current of air, the atmosphere we breathe shall be rendered purer, many lives may be saved, and many who are now obliged to leave the place, may be able to remain and attend to their respective occupations.

This paper was written and given to the Governor General shortly after his Lordship had sent for me on the 2nd September, 1828.

NOTE.—*Annesley* on soils and situations productive of miasmata, &c.

Page 55.—The copious extrication of unwholesome effluvia from salt marshes and partial inundation of the sea has been long admitted, and has only been disputed by one writer of eminence, who instances in disproof of the position, the salt marshes of one particular district in the western hemisphere, but there it is probable that there was some peculiarity in the soil and its productions which rendered the formation of malaria impossible.

Page 56.—Experience will prove, &c. &c. when such soils have been inundated by the sea, as from the breaking down of embankments, &c. the formation of deleterious effluvia has become most abundant, and has been the source of a most devastating pestilence. In proof of this we may mention the noxious situations and salt marshes at the mouth of the Ganges, the Irrawaddy, and the Indus, and numerous other places in the east. In the north of Holland the fever which was so destructive in 1826, was a very strong proof of the deleterious effect of salt water*.

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* "The epidemic which prevailed in Holland, and particularly in Groningen and its vicinity during the summer and autumn of 1826, seems to have been owing to the partial inundations of the country by the sea during the preceding winter and spring. Through Friesland, and particularly in the town of Sneck, observes Mr. Kerchoff, (Journal complement : January, 1837) this cause appears to have had a decided influence. Sneik is a handsome and well-built town, the streets are broad, the population in 1825 was 6373, and the deaths were from 10 to 12, monthly. In the autumn of 1826 it became the centre of the epidemic which ravaged Friesland, and in July the deaths were 23, in August 87, in September 80, in October 127, and from the 1st to the 20th of November 62. The water in the fosses of this town is generally limpid and running, and that which usually fills the adjoining ponds and lakes is equally pure, and suited to domestic purposes. But after the breaking down of the dykes in 1825, and the consequent inundations, the water became salt and brackish, and during the high and continued heat of the following spring and summer it became greenish, and so offensive, that the workmen could not labor in the vicinity without being seized with intermittents and remittents. As the summer and autumn advanced the fever assumed a remittent and even continued form, and the effluvia from the soil became more concentrated and noxious, as the waters were more completely

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Page 57.—The effects resulting from the inundation of the ocean are not perhaps referrible so much to the circumstance of a small quantity of salt proving a septic, as is supposed by many: for it seems evident the antiseptic properties of salt are in proportion to its quantity, and that a small portion will not have a septic tendency, because a large one has an opposite effect. The subject has not received its desired attention; and authors have, in respect to it been more prone to copy the suppositions and admissions of their predecessors than to examine into the grounds upon which the opinion is founded. *That sea-water mixed with fresh-water and vegetable matter in a state of decay, will increase the generation of effluvia* under the influence of a powerful sun, and render them more concentrated, SEEMS TO BE THE FACT. It has been *repeatedly* presented to *our notice*, and is supported by the *testimony of the majority of observers.* But this result seems to be *owing to the quantity of animal matter sea-water contains, which occasions* it to *run faster* into putrefaction than fresh-water when subjected to a warm temperature and kept at rest. Much is owing to the lowness of the situations where inundations take place, and the quantity of vegetable and animal matter in a state of decay which such situations contain. The exhalations proceeding from these places, whether within the tropics or in temperate regions during warm seasons, are generally more noxious during very moist states of the air, a condition always present in warm climates; and they are still more particularly *hurtful when* they have been collecting for a considerable time owing to the continuation of calm weather, and the absence of thunder storms, or those more violent atmospheric vicissitudes which are so beneficial in sweeping away the exhalations accumulated in low and narrow ravines and among the thick underwood of tropical regions.

No. 2, 1829.—Continuation of the same subject—Allusion to the soil around Calcutta—Sir H. East's opinion of the same after one experimental boring—Remarks on the bad effects of marsh and jangal air; allusion to cases and localities—Remarks on cultivating the Sundarbans, &c.

TO MAJOR BENSON, *&c. &c.*

SIR,

In continuation of some papers which I had the honor to give some time since for the information of the Right Honorable the Governor General regarding the healthiness of this Presidency and its suburbs, I have the honor now to submit some further remarks on the same subject.

drained off by the continued warmth of the season. At the same time the bad water was used, without sufficient purification, for domestic purposes. These causes although instanced here with respect to this particular place, were also present in equal force at Groningen and other places in Friesland; the fever which was at first intermittent, assumed a continued type, and during the exacerbations the pains of the back and head were increased. In the majority of cases the liver was much affected. In the months of August and September the fever assumed the character usually presented by fevers in low and moist situations within the tropics, the circumstances occasioning them being in every respect similar."

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In my former statement I alluded generally to the various causes to which I was led to attribute much of the unhealthiness of this place, and amongst these were various nuisances, which I took the liberty of pointing out; such as the great quantity of surrounding jangal, the numerous small dirty tanks, cavities, &c. and the general state of the drainage. I have since gone further in my investigation. This and practical observation have more and more confirmed me in the opinion that I have always entertained relative to these several causes being productive of unhealthiness by contaminating the atmosphere, and generating what is termed malaria.

That I am not singular in my opinion of the bad effect of stagnant drains is evident (in addition to other authorities which could be produced), from a circumstance of late practical occurrence, which I beg leave to quote. It is what lately took place at Gibraltar where extensive sickness had prevailed; a Dr. Wilson who was there speaks of the Augean drains, and attributes the illness to malaria. I have appended the short account he gives of it. If difficulties have existed in respect to draining in Calcutta and its vicinity, I am inclined to suppose that they do not arise from the nature of the soil, and without feeling competent to give any opinion on the practicable part of improving the drainage, I am not I think going too far in suppoing that the new canal now being cut would afford a great means for the drainage of all that part of the Town to which it runs parallel. This great improvement is now rapidly going on, and viewing it merely in one point—that of the healthiness of the neighbourhood—we have only to look at the broad belt of jangal that has been cut down for it, and the numerous small tanks which have either been cut through or filled up, to be convinced of its great benefit. Besides commercial and other public advantages, this benefit and improvement would indeed be greatly extended, if the canal was, instead of stopping at the present eastern canal, to be continued round the remaining part of Calcutta, and to join the Tolly's Nullah towards Bhawanypore or Allipore.

Considering that the nature of the soil might have much to do with the dampness and unhealthiness of this part of Bengal, and having for some time past taken opportunities of collecting various peat earths that abound every where about these parts, I had examined the earth in several places, by boring with a machine to various depths, when my attention was called to the circumstance of Sir Edward Hyde East having in 1814 made a boring 140 feet deep near the river, in search of a spring of pure water; he in a paper which he communicated to the Asiatic Society remarks, that the different strata through

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which the borer penetrated have furnished the following observations.

1st. "The primary object of getting at a spring of fresh water entirely failed, of which sanguine expectations had been formed by the projector of the experiment, grounded as it should seem upon the common opinion that the soil of all the lower part of Bengal was particularly moist and full of springs; an opinion, which this experiment, if it can be taken as affording any criterion of the soil throughout the vicinity of Calcutta, has so far happily discountenanced. The first appearance of any damp was at the depth of 71 feet in a reddish clay with a quarter of sand, and below 76 feet the earth was as dry as before, though the borer must have descended nearly to the level of the sea, which as the crow flies, cannot exceed 70 miles in distance, which the fall of the river commonly computed at 1 inch a mile is supposed to be according to its windings.

2nd. "The damp of the climate not being attributable to the moist nature of the soil, nor affected by it, otherwise than as an admixture of saltpetre in the soil may be supposed to have some influence on the exhalations from the surface, must be looked for, principally at least, from causes upon, or above, the surface, to the want of a general system of drainage in a level country, and the luxuriant vegetation, with inadequate openings through the woods for ventilation, which prevent or impede the copious falls of rains at the periodical season, and not unfrequently at other times from running off properly. The heavy dews at other seasons are not probably more than sufficient to supply the daily exhaustion of the sun, and would rather contribute to the healthiness of the climate. All that seems wanting, therefore is surface draining upon a general plan, and the cutting of broad strait roads through the woods, as much as possible in the direction of the prevailing winds. The acknowledged improvement of the climate in and about Calcutta of late years, appears to be the natural result of the superior attention which has been paid by the Local Police to these two objects, the benefits of which will be extended with the extended application of the same means."

Years before this Rennel had made similar observations, and since the period of Sir Edward East's remarks considerable improvements have taken place, though it is obvious that much yet remains to be done. I concur particularly in his observations about the surface draining, and the cutting of the roads in the direction of the prevailing winds, and I may add, that in two of the borings which I have made at a considerable distance from each other, and one of which was in the new canal, I have found that at about 70 feet from

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the upper surface, the yellow clay that was brought up was extremely tenacious and hard, after which water came up to the surface of the bottom of the canal, but it was of a brackish nature. This circumstance tends further to prove the correctness of Sir Edward East's opinion as to the difficulty of meeting with a spring of pure water, and argues, that if such is the general nature of the soil, in digging tanks, no object is to be gained by making them of extraordinary depth, under the expectation of meeting with springs of fresh water, but that they must be considered rather as reservoirs for rain water ; and for that purpose a considerable depth may be proper. But if at a certain depth, say at 60 or 70 feet, brackish water is generally found to exude from the earth, it might not be well to dig through the hard clay which is found to lay a considerable thickness above such brackish water. These investigations seem to prove that the soil hereabouts, which is unquestionably alluvial, does not contain so much moisture below the immediate surface as is generally supposed, and the production of impure air is most probably from the surface rather than from below the surface, though possibly in other soils and climates it may be otherwise ; therefore if a system of surface draining by open shallow drains were adopted the advantages contemplated be Sir Edward East might be obtained

I take the liberty of alluding to considerable advantages obtained at Madras by the establishment of a Board of Health, and referring to the recorded opinion of the Justices of that Presidency, in their report at the last Quarter Sessions, of the utility of this board, and of the improvements that had arisen from the attention of that Government to general points of clearance and cleanliness. If in that place where they have the advantage of a sea wind, such nuisances as these alluded to are felt, it is fair to consider that they will be more felt here, where the vegetation is much more exuberant and the population greater. I would here respectfully submit, that it is worthy of consideration whether similar proceedings to these of Justices in Quarter Sessions at Madras, might not here be attended with beneficial results, and also, whether a Board of Health at each of the large districts or divisions under the Bengal Presidency might not be beneficial. It might be composed of the Senior Military Civil and Medical officers, but should this not be deemed expedient, a Board or Committee of Health in the presidency itself might be attended with incalculable advantages. When I first arrived in 1816 the south-east part of Chowringhee was covered with similar huts and compounds to those alluded to at Madras ; at that time I remarked certain well-built houses near those parts were uninhabitable, and the damp and evening mists about them

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were proverbial. Some time afterwards those huts were all destroyed, several large tanks were made, and the land generally levelled for the purpose of building good houses. Raudon street, Loudon street, Moira and Hungerford streets were finished, and I now observe the formerly unhealthy houses I have alluded to occupied, and no longer considered dangerous to reside in*.

I alluded in my former paper to the very janglí, neglected, and irregular state of the lands on each side of the Russapugglah road leading from *Birgetallah*, Chowringhee, down to the place where the families of the Mysore princes reside: I am every year borne out in forming the same opinion, and coming to the same conclusions I have there expressed, by my observation and attendance upon the princes. I invariably find that when the wind blows over these janglí and swampy parts towards their habitations, fever and that often of the most virulent kind I have ever met with prevails, and this more especially where the houses are low, or surrounded with marshy swamp or jangals, which is the case with several of them. There are some others where the heads of the family have built their houses, three and four stories high, in the highest apartments of which they have their zanána, and here they rarely suffer; but I know some lower-roomed houses where the grounds are kept clean and airy, where they are also healthy, although perhaps not quite so much so as in the higher houses. With the exception of accidents which occur now and then, and hydrocele to which this family seem peculiarly liable, and which often requires operation and attention, I should consider the princes generally healthy, their usual complaints being remittent and intermittent fever and its consequences, such as spleen diseases, affections of the liver, and other visceral obstructions; and although I think I am correct when I state, that since I have had medical charge of these numerous families, now nearly nine years, I do not know of any one fatal case of cholera morbus, or one fatal case of small-pox having happened, (though these disorders have yearly carried off many in the adjoining villages;) but after the last rains I had a considerable number of spleen cases among them. I expect these families will now be tolerably healthy till the rains set in, when those in janglí and damp situations must be expected again to suffer. I have mentioned this regarding the princes, because the facts I think go far in confirmation of my main arguments, the unhealthiness of jangal and swamp†. It would be useless to enter into a detail

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* Huts are now rebuilding and the place getting filthy. August 8, 1837.

† Since writing this, Prince Sooroorooden has been carried off by disease, I believe entirely produced by the filthy state of his habitation—he allowed the most noxious jangal to grow all round his house up to the

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of the particulars, which I could easily do, to prove the unhealthiness of numerous localities in and around Calcutta; one however I may allude to,—it is the case of the late Rev. Mr. Mosquito, a roman catholic clergyman who lately went into a lower-roomed house at Siáldah in the suburbs, which had a small compound covered ancle deep with dead leaves of trees, and close to this compound was a large tank then filling up with stable straw and other filth. His fever was of the most virulent kind, and ended fatally last Friday the 17th instant. This particular cause of illness I believe, to be very common, which makes me thus anxious to bring it to the notice of the Right Honorable the Governor General, and I may be allowed briefly to mention, that I have visited many of the villages bordering upon the Lake, and that I find the inhabitants in point of appearance and health, to correspond very much with the state of those people who inhabit malarial and marshy lands in various parts of Europe and America, as pointed out by well known authors. Since my remarks about what I had seen of the lake I have been occasionally there, and I found that much of the land which during the rains was covered with water has since been dry with jangal growing upon parts of it; the tides have now risen higher than they were two months ago, and have covered at high water part of the land which had been left dry; these lands, being daily alternately wet and dry, must be a constant and plentiful source of malaria, and fortunate indeed is it for the inhabitants of Calcutta that these marshes are not situated south of it instead of where they are. From the borings I have made in many parts of them, I should say that it would prove a most productive soil, fully equal to any about here. A moderate portion only of sand is met with until you go to quite the other end of the marshes near Bamangotta, where more sand begins to appear. In parts where I bored deep, I found in my course the same charred, or peaty earth, to be found every where about Calcutta, and again below this a very tenacious yellow and slate-colored clay. Of the existence of an ancient forest, all, now covered by earth, there is no doubt whatever, as almost every where about 20 feet deep, large timber trees are found in a state more or less of decomposition, but the superfices of the salt marshes, and down to 12 feet, is certainly composed of an earth well calculated for embankment*.

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very doors and windows. I could not prevail upon him to remove this, and I have taken several gentlemen to the spot to shew them what a magazine of malaria existed, and how wonderful it was that life could be preserved within it. His diseases were fever, neuralgia, latterly partial insanity, and he died in an epileptic fit.

* Since writing this, an embankment has been made permanent on the western side of the navigable channel, nearly half across the lake as far as the Byamcarl; the lands, beyond are tolerably high, filled with jangal.

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These remarks bring me to the jangal and waste lands beyond the lake, and to the foregoing observations I hope I may be allowed to add a few remarks on the subject of cultivation. From all the information I have obtained, I am led to believe that these *waste lands in the Sundarbans are capable of being made to produce a variety of crops**. Some coffee plants which I gave to a cultivator of Sundarban lands last year and the year before, and which were planted out by him on the cleared lands are, I am informed, in a thriving state; it may therefore be worthy of consideration whether if this plant is found to flourish, it does not hold out an additional encouragement to the clearing of these jangal lands. I am aware that various opinions have existed respecting the cultivation of coffee in this country, and that its success has been thought doubtful, several experiments have however succeeded and the coffee is considered of a fair quality, I have myself made the experiment to a small extent, and judging from the appearance of the plants in a piece of ground of about 10 acres, I have every reason to believe that the cultivation of coffee here will ultimately succeed. I sent a thousand coffee plants as far up the country as Moradabad upwards of three years ago, and the last accounts I heard of them were very favorable. *Cotton* is perhaps another article that might be produced to a great extent in the Sundarbans lands. In an article in the Edinburgh Review, (No. 91, June, 1827, page 25,) *on the rise, progress, present state and prospects of the British cotton manufactory*, it is stated, "that previously to 1790, the supply of raw cotton for the British manufacture was principally derived from the West Indies and the Levant. But after the termination of the American war cotton began to be cultivated in Carolina and Georgia, and has succeeded so well that it now forms one of the most valuable productions of the United States. American cotton is generally known by the name of *sea-island*, and upland; the former is the finest cotton imported into Britain. It grows on small sandy islands contiguous to the shore, or on the low grounds bordering on the sea. The upland grows at a distance from the coast." This article was written before the late American tariff which has naturally led to discussion upon the cultivation of cotton, and it has been considered that it may be cultivated with great advantage in this country to almost any extent, and of a quality not perhaps inferior to that produced in any other part of the world†. From the description given in the Edinburgh Review of the kind of land on which the finest cotton grows, it appears in some measure to *assimilate to the Sundarbans lands.* I am told that the Bourbon cotton grows well at Diamond Harbour, and previous to the last rains I had some rows of the Bourbon cotton trees in a garden raised from the seed and thriving abundantly, but during the rains they were so very exuberant that I cut them down; two or three only were left, and although entirely neglected and most of their branches cut, they soon came into blossom and produced cotton, which I neglected taking care of, but I got from them quantities of seed which I have given away.

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* American cotton grown in these lands and produced at the Agricultural Society has been considered excellent.

† On the 20th of October, 1829, the Governor General expressed a desire to assist the Asiatic Society to promote the cultivation of superior

From this trifling experiment however it is evident that the plants would thrive here, and it might perhaps be cultivated to a great extent in the low lands of the Sundarbans. Should these lands become cleared, the cultivation of sugarcane on them may become an object of importance. It was observed by a Mr. William Fitzmorice, (who had been in the West Indies many years) in a statement he made to the Honorable the Court of Directors, and which he printed in 1793: "That the more he saw of this luxuriant soil the more he was convinced that they might annually import from Bengal any quantity of sugar, and a proportionable quantity of rum of a superior quality, without interfering in the smallest degree with the present cultivation and manufactories of Bengal. Indeed that the waste land occupied by the tigers, between this and Injella would produce nearly as much sugar as the island of Jamaica." Mr. Fitzmorice, from his printed work which I have, appears to have been practically acquainted with the cultivation and manufacture of sugar, as it was carried on in the West Indies, and was therefore probably capable of forming a correct opinion on the subject, as well as on that of the cultivation of coffee, of which he also wrote, but which coffee cultivation has only (so far as I can learn) been attempted of late years, though the plant has long since been found to grow well in private gardens; much of this land to which Mr. Fitzmorice alludes has since been brought into cultivation. Rice is I believe the principal crop, but of the vast tract which remain in a state of waste jangal on the east of the river Hoogly, and towards the Sundarbans, much might no doubt be made productive, and if sugar should be found to thrive on those lands, it is evident that it might be cultivated to a great extent.

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cotton and tobacco, and the Court of Directors in 1831, sent out American cotton seed, and Government sanctioned an experiment at Akra in the Agricultural Society's ground, the particulars of which will be found in their report published in 1835. The Society also sent American seed to various parts of India, and the samples of cotton sent by several of the experimentalists were excellent.

You will oblige me by laying this paper before the Right Honorable the Governor General at his Lordship's leisure.

(Signed) F. P. STRONG,

April 23rd, 1829. *Surgeon to Suburbs of Calcutta.*

No. 3, 1829.—*Continuation of the same subject—Boring for Artesian springs advocated—Success in Europe of late years, giving the authorities—Further remarks on the Sundarbans with quotations from Baron Humboldt on the advantage of civilization, and the Abbé Man on the healthiness produced in the Netherlands by clearing, cultivation, and civilization.*

To Major BENSON, *&c. &c.*

Sir,

In the papers which I had the honor to submit some time ago for the information of the Right Honorable the Governor General, I entered into an explanation of what I conceived to be some of the principal causes of unhealthiness in Calcutta, its neighbourhood, and the lower part of Bengal. In doing this I was naturally led to make some remarks upon those great sources of malaria or impure and unwholesome air, the Salt-water Lake, and the jangli Sundarban adjoining; considering that the draining of the one and the clearing of the other would be a great public benefit, if even done only with a view of removing such causes of malaria and consequent illness.

In carrying into effect such measures, one most important necessary of life must be obtained, or else it is to be feared that any improvements which may be attempted will proceed very slowly and cannot ultimately be carried to a considerable extent. The article to which I allude is a good and sufficiently abundant supply of fresh water fit for drinking.

This is an article even much wanted in Calcutta itself, particularly during the dry and hot months; and much illness amongst the natives has, and no doubt correctly, been attributed to their drinking dirty, stagnant and putrid water. The supply of good water might, I am strongly inclined to hope, be much increased in and about Calcutta, and that by the simple, speedy, and comparatively trifling expensive plan of boring*;

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* From M. Arago's work on Artesian springs, 1834-5.

Issues from principal fountains.

St. Andrè nearly two tons per minute.
Bages, 333 gallons per minute.
Tours, 237 ditto ditto.
Merton, 200 ditto ditto.
Revesaltes, 176 ditto ditto.
Lillers, 155 ditto ditto.

should this plan be tried and found to succeed here, it might probably meet with similar success if tried upon any of the cleared lands or upon the Salt-water Lake, when drained.

My hopes of success are in a great degree grounded upon the examples of boring which have taken place in England, where this mode of obtaining a good and constant supply of fresh water has lately been much resorted to, and has met with the greatest success, not only in London and its neighbourhood but in the lower parts of Lincoln, Kent, and other fenny districts*. In some of these where the inhabitants and their cattle suffered much from the want of good water, the evil has lately been removed, and this essential necessary of life has been supplied by means of perforations made to a great depth in the soil, by boring with an iron auger so as to reach and bring to the surface the deep seated springs†. To some of the instances I beg leave to refer. Borings which have been made from 200 to 400 feet deep, have been found to cast up from 15 to 20 gallons of soft and remarkably pure water per minute, which without the use of engine or pump will rise from 20 to 30 feet above the surface up a tube or guide-pipe‡. Wells have been bored at Tooting, Mitcham, and Merton, in Surrey§; one at Merton is said to cast up 200 GALLONS of water a minute‖, and one at Tooting nearly 100 gallons. At Leeds 100 yards deep has been bored for water, and cast-iron pipes used for conducting it¶. Some partially unsuccessful experiments have been made in chalk**. But water has been obtained at Sittingbourne in Kent (in which neighbourhood it may be remarked, that the land is level and low) after boring 336 feet. In Bedfordshire 400 feet and in Surrey near Dorking 440 feet in depth have been bored and water obtained††. At Hammersmith, boring is said to have been much practised lately. The water obtained there which was of a su-

Depths bored.

St. Nicolas d'Ailermont through 7 sheets of water 1,[illegible]30 feet.
Geneva, 682 ditto.
Suresne, 663 ditto.
Chiswick, 582 ditto
Bethune, 461 ditto.
1834 M. Champaiscan, 275 ditto.

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* Edinburgh new Philosophical Journal, December 1828, p. 170.

† Mechanic's Magazine, vol. i. p. 293.

‡ Ditto, vol. ii. p. 31.

§ Since my writing this M. Arago has particularly alluded to *this* boring.

‖ Mechanic's Magazine, vol. ii. p. 60.

¶ Ditto, p. 382.

** Since this several successful operations have been performed in chalk.

†† Mechanic's Magazine, vol. v. pp. 230, 232, 258, 315, &c.

perior quality, and the supply regular, in some instances 200 or 300 gallons per hour, but in no case is it said to be less than 80 gallons per hour, and the depth bored has been from 300 to 380 feet before the water was found, after which it has run over different heights above the surface according to the strength of the spring. In the Duke of Buccleugh's grounds at Richmond Hill*, (where an excellent apparatus for perforating the different strata of the earth is said to have been used,) after boring 252 feet, a supply of most excellent water has been obtained, yielding 13 gallons a minute, and rising as in a fountain 24 feet above the surface of the earth. These examples not only shew to what extent boring for fresh water has been practised in England, but it will also be seen from them, that this method has been successfully tried in both high and low situations and through various kinds of soil. I will also add a quotation from a work apparently of much practical utility. In Loudon's Encyclopædia of Agriculture†, p. 671, it is said there are "borings in Middlesex and Surrey which afford a continuous and abundant flow of water, equal to 8 gallons per minute. A very copious fountain which rises twenty feet above the surface, has lately been obtained by the same means in the grounds of Ravenscroft Park, the seat of G. Scott, Esq. near Hammersmith." Indeed there can be little doubt that in the majority of situations not only in Britain but throughout the world, water might be found by boring or digging down a few scores of feet. The expense in England, as mentioned in the same work, (p. 671) is stated to be equal only to one-eighth that of well digging, and it is remarked that "the advantages of flowing springs of good water, which by these means may always be obtained on the sides of roads, and in a variety of other places where water is not at present found, are incalculable, the cost very small, and the operation easy and "expeditious."

If the advantages are so incalculable and so easily obtained in England, it must be obvious that they would not be less so in a climate like India, and particularly in this part of the country where they are so much needed, and where although the

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* Mechanic's Magazine, vol. vi. p. 167.

† In this work will also be found an interesting account of the mode of raising lands near the river Humber by warping, or letting in the river water and allowing the warp or mud to settle. By this method lands have been fertilized, and raised from 6 to 16 inches in the course of a year. An article also in the Mechanic's Magazine, vol. — p. 99, gives an account of this method of warping lands by the water of the river Ouse, and speaks of raising lands near 3 feet in the course of a year. The water of the Hooghly containing a much larger portion of mud, might perhaps be applied to the same useful purpose of raising the soil of the Salt-water Lake or other neighbouring low land.

CSL

water of the Hooghly, as far down as Calcutta may be tolerably good during most seasons of the year, and tolerably good water may be preserved in tanks, yet the supply often becomes scanty, and when the tanks are low, brackish and bad. Boring, if found successful, as I think it would be, is therefore a matter of more importance than it may at the first mention of it appear to be. In the fort in particular it might be found to afford that supply of water which all attempts to obtain have (I am told) hitherto proved unsuccessful and expensive, the wells being all brackish, and the puckah built reservoir made for the purpose of retaining a supply of rain water having after repeated expensive repairs been found incapable of holding water, and its use for that purpose being therefore discontinued. Several borings for fresh water have also been made here, and amongst them some in the fort, and the only reason why they have not been successful is, I believe, on account of the inefficiency of the boring apparatus, and its not enabling those who have made the attempts to go sufficiently deep. In two borings made in the fort in 1820, they were not able to penetrate deeper than 122½ and 128 feet: in both these attempts there was no indication of fresh water, but the earth brought up was occasionally damp and moistened with water of a saltish taste, a great deal of stiff clay was met with, and in both cases the *rods broke* and remained in the ground. The deepest boring I can find an account of is that given by Sir H. East to the Asiatic Society in 1814, and that was 140 feet; no fresh water was found, and here the *rods broke* and were left in the ground: the only other accounts of any boring I can find was in 1804, wells from 20 to 40 feet deep having all proved so brackish as to be unfit for drinking. The borings were undertaken for fresh springs in the first; after surface mould, sand, &c. the borer passed through hard clays with kunkur, it penetrated to 75 feet when the water rose to the height of the water in the adjoining wells; it was analysed by Dr. Hunter, he considered it unwholesome, as containing a very large quantity of common salt, muriate of magnesia and clay.

In the second the same sandy clays, kunkur and white and yellow sand presented themselves at 70 feet: the borer was brackish at 81 and at 101 feet the rods came up nearly dry. A well of tiles had been made round the borer for the first 30 feet, and the water rose into it within 7 feet of the surface, fully four feet of the ground. At this place the ground was artificial above the general level of the country. During the whole dry season the water only subsided in this well 3 feet, and was on the 3rd June, 1805, only 10 feet below the surface, whilst the water in wells at a little distance was 30 feet below it. Here the lowest depth was 119 feet; coarse-grained sand was found, and the soil was very hard, *the borer broke* and was not recovered. The third was in December, January and February, 1805-6; similar earths were obtained above, and from 114 to 127 feet was found fine yellow sand, coarse sand, and very hard earth—here *the borer broke and 91 feet of rods were lost.* At 65 feet the water was brackish, but the deeper water rose to within 4 feet of the surface, and was well tasted. The fourth attempt was in March, April and May, 1806. Similar earths presented, very hard, from 120 to 127½, yellow clay, sand and yellow sand; here the auger *was* partly *broken*, the edges were found sharpened like a knife. It was remarked that the water at 66 feet appeared tasteless, probably owing to the heavy rains that season in March, which had made the water in all the wells tolerable.

The late Mr. Jones, a person who was well known as having opened the Burdwan coal mines, made a boring and found the same earth and clays, but he did not go beyond 70 feet deep; here he found kunkur, clay, and yellow sand, and he says at 70 feet through a stratum of red coarse sand issues a spring which is acted upon by the tides in the river. The borings I have made have been comparatively trifling for want of proper apparatus. I however bored down to 40 feet near the west margin of the lake, where I found very stiff dark clay, and at the bottom some hard kunkur mixed with it. As I mentioned in my last paper, I bored at the bottom of the circular canal, and found water at the depth of 70 feet from the upper surface which rose 50 feet and formed a pond, which was banked in at the bottom of the canal. This water appeared to me and my friends brackish, but on its first appearance the laborers drank it and said it was good. At this place the clay which is of great depth, and in parts beautifully yellow and containing kunkur, was so very stiff, that at 50 feet a large and strong auger was twisted in a most extraordinary manner, and two Europe-made strong iron-hooks, were broken in extracting the rods, which was done by means of a strong gin and windlass.

In a garden in the Circular Road about two miles from the above place I bored through very stiff clay to 70 feet deep, and came to some kunkur and I suspect other harder substance which prevented my getting further, and I found the auger much scratched and polished.

At Russapaglah I could not penetrate deeper than 70 feet; at this depth I applied a smaller auger to the bottom of the larger rods with a view to perforate where the large auger failed, but this broke and was left 70 feet in the ground. In these borings I found myself much disturbed by the frequent falling in of sand from the upper strata, and I had not a cast-iron tube to prevent it: such will be necessary in any future borings, and a proper frame-work and mechanical means for raising the rods will also be required.

I am told that there are in Fort William different sets of boring instruments sufficient to go a depth of 600 feet or more, and that they are of greater strength and excellence than those used in 1805 and 1820; but a gentleman who has lately arrived from England informs me that a newly invented borer is now in general use and much approved of.

Having given his Lordship a detail of the plans which I respectfully suggest might be adopted to obtain a supply of fresh water. I also take the liberty of mentioning a few circumstances of information which I have picked up in the course of my inquiries relative to the Sundarbans. As the circumstances tend to support the principle which I laid down in my former communication of the prevalence of malaria in all jangalí, marsh and ill-drained situations, and of its effect upon the inhabitants of such places.

Baron Humboldt gives tables to prove that in certain places the duration of life has been greatly prolonged by attention to cleanliness, improvements and civilization. A little attention and inquiry will, I believe, go far to prove that there is much room for such change amongst the natives of Bengal, but more particularly amongst the inhabitants of the small and thinly scattered villages in the Sundarbans, who I am assured are a most wretched and short-lived people, continually suffering from poverty and want of cleanliness and civilization, and from disorders produced by bad air generated in the jangals surrounding them. Numerous inquiries I have made among intelligent natives confirm this, and although gentlemen who have passed through the Sundarbans may differ a little in this opinion, it is not to be supposed that their curiosity has led them to visit the villages in the interior, or to make inquiries of such a nature. An intelligent native who has much experience of the Sundarbans in those lands considerably south of Tarda, has assured me repeatedly and most positively, that it is his belief that scarcely one in ten of the villagers escape fevers during the months of July, August and September. The villages he says, consist of 50, 100, or 200 people, including men, women and children. They have their native doctors, but many die annually of fever, and the spleen disease prevails very much among all, old and young; these opinions apply to the inhabitants born and always living in these jangals, whose constitutions are known to be more capable than others of resisting the poison of malaria. The darrogahs, chaprassis, and servants employed by Government in the Salt Department* are sooner attacked, and when ill they always obtain leave to go to their homes. The villagers are generally salt molungies, wood-cutters, boatmen, fishermen; some shoot game, others collect wax and honey, and others spin and make coarse cloth for the villagers. Of the little land at present cultivated I am informed rice is the chief produce, and grain, cullie and other vegetables grow about the villages, in all which there are tanks: without a tank my informant assures me that no husbandman will settle to work, but wherever a tolerable tank is made, that of itself will bring inhabitants. I do not believe that any Europeans could live in the interior of the Sundarbans as they now are, but were it possible to clear them by cutting down and cultivating from their external extremities and go on gradually towards the interior, and if the land were well drained I see no reason why these parts should not be as healthy as any other place in Bengal. With regard to the external clearing I allude more particularly to the thick and low jangal bordering upon the Salt-water Lake, and which from all I can learn is more productive of malaria than the forest jangal towards the sea. If I recollect right I think Messrs. Schalch and Morrieson when surveying the Sundarbans found it so, the latter in particular as he had a predisposition to fever, and he found in the deep broad rivers where the timber trees around him were high admitting wind, and where low jangal did not prevail, that himself and his servants were well, but when he approached towards the Tarda low jangals, himself and his attendants suffered. I have heard of one respectable countryborn gentleman who with great industry and assiduity cleared an extensive tract of land beyond the lands I have been speaking of: he fell a victim to malaria. Another who has cultivated and cleared a good deal of jangal lands between this place and Tarda, is constantly suffering from fever though he visits his grounds only one day at a time, and that only two or three times a month. He employed as an overseer a healthy Portuguese, but he died of fever before he had been there two months.

I may here mention as regards fresh water, that this latter cultivator informs me that in March 1827 he dug a tank on a high spot, in which he found a spring perfectly pure which filled a place walled in to retain the water about two feet high, and

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* The Government having lately removed the salt-works more to the southward has already been found beneficial to the more northern grantees, as the salt molungies have willingly become agriculturists; and it will be seen in the map that along the line of the new navigation running direct eastward from the lake, a very great deal of jangal has been cleared away.

CSL

the water continued at the height, although the two adjoining settlements and all the passengers to the amount of some hundreds went to this well daily, and if it did sink a little in the day it was sure to fill up the following morning. He made it into a tank of 10 cottahs, and it continues to supply all the neighbourhood, who without this would have to go a distance of 10 or 12 miles for water. He also says that near a village called Narrainpore there is a fresh spring about three feet from the surface, but such was the idleness of the villagers that they would not dig a tank; and when he asked them why they did not prefer living upon the higher groundon the river side, they said, they were afraid of being plundered by the boatmen, which is a common occurrence, and he tells me that no native moodie or merchant dares to settle any where except near a Company's thannah. This individual says that he finds very generally upon spots a little raised, a simul or cotton tree, which makes him think these parts were formerly inhabited; and the other gentleman found an old house. I believe also that the remains of old tanks are here and there to be found*: upon the whole I have no doubt that if boring for water in these parts should be found inexpedient or inconvenient, that it can be collected and preserved in tanks, at least as good as such water generally is about Calcutta, so that the want of water should not form an objection to the clearance and ultimate cultivation of these jangals which are so close upon Calcutta. But the boring appears to me to be a preferable mode as being cheaper, more expeditious, and as by going to a much greater depth than can be gone in tanks, the probability of getting pure water, and a constant supply is increased.

These Sundarbans—unlike the Campine of Brabant in the north of the Netherlands which the Abbè Man states "originally consisted of sand, covered with heath interspersed with lakes and extensive marshes, and here and there with woods of fir, and which tradition reports to have been once a part of the sea, and unlike the arid wastes in some parts of India,—are already fertilized in the highest degree by the decaying vegetation of years, and are, I respectfully conceive, calculated to produce a new and vast revenue to the state after a time, *and when a scheme shall be adopted that shall induce laborers to commence this work to a considerable extent*†; for it is not because the lands are

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* Since this period about 100,000 biggahs have been cultivated, and in all directions the same proofs of former cultivation appears.

† Grants were made in 1829 and 1830 to numerous persons about Attara Banka to the extent of 500,000 biggahs, about one-tenth of which is now supposed to be in cultivation, in spite of the agency failures and the dreadful inundation in 1833; however, several grantees have done nothing

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barren that they are uncultivated, but chiefly because the air now poisoned by the overgrown jangal is inimical to life, and every year's progress in the removal of this evil adds, in my humble opinion, most materially to the general health of the country. Even the poor Campine of Brabant after partial failures is now stated by the above cited author to possess many extensive tracts well cultivated, and is covered with villages, well-built houses and churches. No doubt much of the country has been cultivated since the period at which Lord Coruwallis remarked that he might with safety assert, that one-third of the Company's territory in Hindustan was a jangal inhabited only by wild beasts. We know of jangal as near the presidency as Sooksagar under European management, having become invaluable land, but in the immense forest jangals and uncultivated tracts of Hindustan it is not impossible that a field might be opened in which the natives, and perhaps others, might raise for themselves an abundant supply of the necessaries of life; the field appears inexhaustible and would be employment for thousands, while the cause of much disease and sickness (both among mankind and cattle), would be gradually diminished, for it is ascertained that in those years in which malarial endemics and epidemics have prevailed, epizootic disorders have prevailed amongst cattle. Without going into ancient authority, a late writer, Dr. Macculloch, states it as a general fact, that cattle or animals of different kinds do become sickly or diseased in the same situations which produce the diseases of malaria in the human race, and that the consequences are as resembling or analogous as they could be under the differences which exist*. He states these facts to have shown themselves in Egypt, in Hungary, in St. Domingo and Gaudaloupe, as well as in France at Rochelle, and in Auvergne and Raussillan, and alludes to that particularly pointed out by Bailly, of the year 1812, at Arles, and adds that analogous observations have been frequently made in Italy; and not to quote more than is necessary, the years 1711, 1738, 1745, 1772, 1783 and 1795, are among those which have been particularly recorded for epizootics among cattle, each of them being also noted seasons of epidemic fever, or of the prevalence of malaria; and that further they all occurred in

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and the five years having long expired the land is resumable by government to give to others who will clear it. At this time, October 1836, several pilots who have cultivated several thousand biggahs near Attara Banka, expect as good a season as they had last year which was highly satisfactory to them.

* Macculloch, p. 453. Although not noticed by Dr. M. [illegible] another ancient author, Livy remarks, that in the same years in which epidemic 'pestilences" appeared among the people, there was also a great mortality among the cattle.

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the months of August, September and October, and were also confined to the marshy or unhealthy districts. I am acquainted with some indigo planters who have remarked illness and mortality to prevail among cattle in times when cholera morbus has scourged the land, and I doubt not that there are many persons in Bengal who have remarked the same thing: I myself observed the same in the neighbourhood of Dacca some years ago.

The last year has been more healthy than any I have known*, and is the first year since I have been surgeon of the suburbs that I have not had an additional number of native doctors, 20 or 30, stationed at different posts with medicines and instructions to administer to every case as quickly as possible among the natives, and I believe Calcutta itself has equally escaped the scourge this year; certainly Calcutta and the Entally suburbs have been generally more healthy than usual. With my respectful apologies for the length of this paper I conclude by alluding to one or two localities, particularly this hither end of the old Entally canal, being always in a filthy state. It was only early last week that I was called in consultation with another medical gentleman to see a child dangerously ill in the house exactly at this end of that canal. My professional friend now informs me that the child is doing well, but that the father and mother have since been both seriously ill, that the latter was delirious, and for some days nearly dying, they have quitted the house; and such is the nuisance here, that a gentleman and his family have been obliged to quit the very next house to the one alluded to, which is only just behind the Marhatta Ditch, opposite the Dhurrumtollah. As the first step towards eradicating an evil should be to ascertain its cause with as much certainty as the subject will allow, in order to judge of the capability of applying a remedy by its removal, so I have little doubt, that upon examination and inquiry, the causes of unhealthiness of particular situations in the town and country might be readily traced, and in most cases removed, without so much difficulty as might perhaps be expected. It is not to be wondered at that particular parts of the country or the town should be unhealthy, if in the one case they be covered with jangal or swamps, or in the other they abound with nuisances which equally contaminate the air. Pure air as well as pure water is an indispensable requisite for health, but it is impossible to look at the stagnant pools of water, the dirty ditches in the native part of the town, and particularly at the low ground

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* In the early part of 1828, there was a good deal of fever in the Entally suburbs for a short time.

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within the Strand road, from where the Hindu bodies are burnt almost up to the new Mint, which ground is in many places covered with stagnant filthy black water, into which stable dung and other filth is thrown to fill it up, and not to be convinced that such places must make all others near them more or less unhealthy, while there can scarcely be a reasonable doubt that if these causes were removed, the air would be more pure, and the situations now affected by them equally healthy with the best parts of the town.

23rd July, 1829.

To F. P. STRONG, Esq. *&c. &c.*

MY DEAR SIR,

I have been extremely remiss in not having executed a pleasing commission which the Governor General entrusted to me some time ago. It was to request you would accept His Lordship's thanks for the communication you last transmitted through me for his information, and to say he esteems it an able paper.

I remain, &c.

Govt. House, 14th August, 1829. R. BENSON, *M. S.*

No. 4, 1830.—*Topography of Suburbs generally.*

Many localities have been pointed out to me as unhealthy, and the filthy state of the Mussulman burying-ground in the Circular Road, is considered particularly so as making Cossiebeggan, very unhealthy; it is surrounded by broad ditches of stagnant water, filthy to an extreme degrees. Different parts of Tiljullah and Entally are also well known as unhealthy, and certain particular houses are considered uninhabitable. A few years back a great number of poor were turned out of grounds* purchased by the Lottery Committee, and they built their huts in a particular part of the eastern suburbs†, on the other side of the Circular Road, surrounded by jangal, and badly drained; so great a number died of cholera, that it was found difficult to dispose of the dead bodies; this was after a sudden change of the weather, but these new inhabitants who had located upon a mere jheel, suffered much more than others. The small houses occupied by poor Europeans and Christians of color, near and on the banks of the old Entally nullah, are dreadfully unhealthy*, and people are constantly obliged to quit. Continuing along south of the old nullah towards the lake, there is a great proportion of ground entirely neglected and uncultivated, and this sort of ground is to be observed here and there, among garden ground, filled with high trees, the mangoe, jack, &c. and much of this in a filthy state; then you come upon low rice fields, and then the borders of the lake appear. There are to be observed the remains of several old roads made by the late Mr. John Elliot, but most of these are so covered with jangal, their ditches filled up, bridges broken, and the jangal so impenetrable, that it is impossible to traverse them; the eastern suburbs I now allude to must at a former period have been in a very superior state to what they are now, and there are several old brick houses, chiefly native, and apparently deserted, which go to confirm this fact. In the south, towards Balleegunge, and near the rice fields, the grounds about the villages present numerous excavations of earth, taken for the purpose of brick-making†; these being left open, all sorts of nuisances collect in them, but more particularly the leaves of trees, and these decomposing with water and heat must afford a rich production of malaria. Still further south Balleegunge is jangalí and badly drained, and Bhawanipore and Russapaglah present a continuance of the same evils, many parts looking more like Sundarbans than inhabited villages.

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* Short-bazar grounds.

† Marked on the map *Curria.*

Then going back, and looking to the north of the old Entally canal the same description applies, the same obliterated roads which formerly ran north and south in the direction of the winds, which were broad and once had good ditches and bridges, all are now useless, and covered with jangal, the habitation of jackals and snakes; and the same belt of jangal and villages is continued towards the Dum-Dum road.

This constant source of contaminated atmosphere all *round our city is sufficient to produce disease, however cleanly we may be within*; but Calcutta itself has not much to boast of in that respect, although it is decidedly much more healthy than formerly, even within my recollection and practice here. The opening of roads by the Lottery Committee over parts which I have often traversed when in their unimproved state, has evidently produced a healthiness and cleanliness before unknown, and this fact goes far to prove what good may be done by the free admission of the prevailing winds, by cleanliness, and by surface draining. In the city, and in the back lanes of Chowringhee, the Circular Road, &c. the bazars, which have sprung up irregularly have become an intolerable nuisance which ought to be abated.

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* Since this was written a Mr. Ward, the senior clerk of the Sudder Board of Revenue, who I had often advised to quit his house which was on the banks of this nullah, has fallen a victim to malaria. He was naturally a very healthy, stout, active and strong man, when he went to reside on this spot.

† I hear that there was formerly a regulation which prevented brick-making on this side of the river, and that formerly all the bricks were made on the other side of the Hooghly.

The drains all about Colingah, and towards the Circular Road are bad generally, currents of water meeting and running in all directions. Broad roads, with good drains should be continued from the Circular Road in the direction of the plain*, which is a rice cultivation towards the lake, and cross roads should be made at convenient distances; if such roads† were made and the jangal cut down, many persons with small incomes would be glad to build in these parts, more particularly about Entally and Tiljullah from being so contiguous to town, where many of such persons have offices to attend daily. Ballygunge is rather too far off for such people, and would appear to approximate to such places as Allipore, and Garden Reach, for gentlemen who can afford to have gardens and large compounds and outhouses. In all probability such new buildings in Entally and Tiljullah would be built upon an improved plan. If small houses, or indeed any houses, were built upon godowns, with apertures to keep such godowns well aired‡, which might be used for servants, or to keep things in, would it not be better than the outhouses we now see, with the high compound walls surrounding every place, and which prevents the ingress and egress of air, and renders the air the inmates breathe more confined and foul? and if *iron rails*§ were more generally adopted in the place of the heavy compound walls with pompous gates, habitations would be much more airy. Large tanks upon an improved plan are much required all about Entally and Tiljullah, as well as along the Circular Road generally, and I have known in very dry seasons this want not only extremely distressing to the poor Natives, but to poor Christians also on both sides of the Circular Road, who have often complained to me how much they feel the want of this essential necessary of life. Such large tanks would not only produce mould to fill up little cavities, dirty pools, and certain unnecessary ditches, but they would, if placed where four roads meet, tend greatly to make the place more airy. I think Bishop Heber describes Mirzapore, where there was a school and some Missionaries, as dreadfully unhealthy*; the clearing since adopted has rendered that place very healthy; the Bishop also I think, was told by his sirkar how notoriously bad the Entally nullah was, and that he never passed it without his handkerchief to his mouth.

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* Formerly there was a very long ditch which ran out far towards the Lake, but it is now nearly obliterated. This was brought to my notice by Captain Jenkins.

† Sir Edward Hyde East strongly advised broad roads in the direction of the winds, and surface draining instead of so many deep drains as we have, which become stagnant. He thought the more superficial surface draining properly managed, would keep the upper surface of the earth tolerably clear and dry. That part of Chowringhee behind the theatre, and between that place and the burying-ground, is acknowledged now to be much more healthy than it was before the new roads, tanks and buildings were made.

‡ Such a plan of building ought to be generally adopted in all low situations in Bengal.

§ Since writing this several houses have been thus improved; among them, three of the largest houses in Esplanade Row now are allowed to receive air, a clear breeze from the maidán which was formerly shut out by high walls.

The natives where they reside make all their tanks small, and, as if it was intended that malaria should be produced, they seldom fail to plant trees round their tanks, so that you commonly see the surface of them quite green from the vegetation—this must have been remarked by every one; such are abundant about Entally, on the right and left side of the Balleegunge lines, and all down the Russapaglah road and Tolly's nullah, and not less so in Kidderpore. I am of opinion that trees ought never to be planted upon the borders or bank of tanks or nullahs, for their leaves invariably find their way into the water, and laying upon the edge decompose, and go much more to produce the malaria we complain of, than they can act as a surface or barrier to arrest the malaria, as supposed by some authors, although I do not deny that large belts of trees at a sufficient (I mean, a considerable) distance from a city, and properly placed, may perhaps have such good effect, but such an opinion ought not to induce the planting trees near a city, where they are certain to be injurious, not only by their leaves rotting, but by impeding the winds, and preventing the rays of the sun approaching the ground, which remains damp, and assists in the unwholesome decomposition. Such is the case in all the jangal villages around Calcutta, and is evidently the cause of the great yearly mortality in them. All the gentlemen who have gone with me in my drives, agree in the positive statement, that, throughout India, they never met with such crowded green pools, jangal and bad smells, as abound around Calcutta every where in the suburbs; and it should here be remarked as regards filthy pools, and tanks, that they may not only be the cause of sickness by contaminating the air, but may affect the natives who constantly bathe in them, as well as drink the filthy water of such tanks; for in all probability, malaria *may* become impregnated with water, and may thus be taken into the system by the skin or stomach.

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* Now an excellent square, a good large tank with iron rails round the grounds, and Mrs. Wilson's school is in the corner of the square. A large building is now erecting there by the General Assembly of the Scotch Church, for the education of native youth and the place is now acknowledged to be healthy.

For farther improvements and removing impurities of air at this presidency, the draining of the lake and cutting down the jangal beyond it, I conceive to be of great importance. The jangal all down to the sea should be removed, if possible, and it would be a great advantage if excavations, or docks, were made here and there, on each side of the river for ships and vessels to lie in, so as not to obstruct the passage of vessels to and fro. The face of the Lake may probably be materially altered. Ritchie who surveyed the Sundarbans in 1791 speaks of the well known village of Tarda, which is marked on all the maps (as being on the borders of the lake). This place is now about the same distance from the further borders of the lake, as the distance is from the Ballighat entrance, along the navigable canal to its present furthest borders, on the south, *Bamanghatta;* therefore if Ritchie was correct, a very large portion (nearly half) of the lake must have filled up naturally, for on each side of the river from Bamanghatta to Tarda, is thick low Sundarban jangal. I imagine that upon the finishing the canal now making, and its opening into the Hooghly, that the lake will almost drain itself—as the low water of the river Hooghly is at times lower than the Lake at low water. Whether this lake be drained, or not, or either so partially drained as to be fit only for rice cultivation, or otherwise warped by mud from the river so as to be converted into garden ground, nevertheless, it is highly desirable for the general health that not only the grounds on this side of it be cleared and improved, but that the Sundarbans beyond it be removed as far from the capital as possible.

No. 5.—Letter to Magistrate of the 24-Pergunnahs on the healthiness of the district, with remarks on the health of Prisoners and the management of them; with Tables of the proportion of sick to Prisoners, on the proportion of deaths to Prisoners, and on the proportion of fatal cases of cholera among Prisoners, to those attacked with that disease for the last 20 years,—also a Table shewing the mortality among the natives in Calcutta for the last five years, and of the other sections of the population for the last 20 years.

To J. H. PATTON, Esq.
Magistrate of the 24-Pergunnahs.

SIR,

In reply to your letter of the 17th of April, relative to the selection of the districts to which prisoners under sentence of banishment are sent, and to the climate of any such districts being likely to prove prejudicial to their general health, and also as to the climate of the district and station under my charge, and requesting my opinion whether it is uncongenial to the constitution of any of the prisoners confined in the jails:—I beg to say, that in taking this subject into consideration, perhaps I may be permitted to take into view in some degree, the effect of the climate upon the health of other classes besides prisoners, and if we had full and sufficient data to go upon, it might be desirable to compare the rate of mortality amongst prisoners in the zillah or district with that of the laboring classes forming the mass of the general population.

The atmospheric changes which began in 1817 to produce cholera, which then became, and has since continued an epidemic disease throughout India, and which has increased the mortality among prisoners as well as among the inhabitants of this country generally, is not yet understood, and other causes with which we are nearly equally unacquainted sometimes occur and render places that have been considered healthy, unhealthy.

I may here be allowed to state that Lord William Bentinck almost immediately after his arrival, upon hearing that I had interested myself upon the subject of malaria, desired that I would communicate my sentiments to his Lordship, and after some interviews I gave his Lordship papers relating generally to the healthiness of Calcutta, and its suburbs; and in a third written communication, I stated that—"The last year (meaning the year 1828) has been more healthy than any I have known and is the first year since I have been surgeon of the suburbs that I have not had an additional number of native doctors, 20 or 30, stationed at different posts, with medicines and instructions to administer to every case as quickly as possible among the natives, and I believe Calcutta itself has equally escaped the scourge (cholera) this year; certainly Calcutta and the Entally suburbs have been generally more healthy than usual." Since this period, four unprecedented inundations have occurred, in 1831, 1832, 1833 and 1834, which must have acted considerably in deteriorating the climate for a time, but with this exception, and always making an exception of the broad belt of dense jangal, dirty tanks, jheels, luxuriant swards and swamps, which exist close upon and beyond the Mahratta Ditch, and extend all round the city, and which formed the more immediate object of my communications with the Governor General, I am of opinion that the sudder station of this district is among the most healthy of any in Bengal and I much question whether there is any Bengal Civil station where the public health will be found better than at Allipore.

I will now proceed to consider the effect of this climate on the prisoners for the last 20 years, during the whole of which time the cholera has appeared as an epidemic; and with a view to shew at one glance the proportion of sick to the prisoners, as well as the mortality among them, I annex two tables, both beginning with the year 1817, and ending last year: one shews the proportion of sick, the other the mortality. The first four years, my predecessor Dr. Young was in charge of the civil duties of this station, and the table shews the average monthly proportion of one sick to eleven prisoners for the four years, while it will be seen that the monthly average proportion of deaths for the same period was one death to 176½ prisoners.

The last sixteen years shews an average monthly proportion of one sick to 21¼ prisoners, and the average monthly proportion of deaths for the sixteen years, appears to be one to 190¾ prisoners. And to prove that the climate has been more healthy to prisoners than was anticipated it would have been twenty-seven years ago, I beg to refer to a letter of my predecessor Dr. Young to the Secretary to Government in the Revenue and Judicial Department, dated the 1st of December, 1811, he says, "There is every reason to hope from the great attention which is now paid to the cleanliness and internal economy of the prisons, that the convicts will be generally much more healthy in future; there is however no reason to suppose that there will be at any time fewer in hospital than *one in ten* of the whole number of prisoners, there has been frequently during the past year more than twice that proportion under my care."

And I here beg to state for the information of the Commissioner that inquiries having of late been made into the causes of mortality and sickness among prisoners generally, I in answer to a circular letter to Mr. Adam, the Secretary to the Committee on convict's labor, entered into questions of a similar nature to those now referred to, and I trust I may be permitted to give some extracts from what I then wrote as bearing upon the same points.

In my reply to Mr. Adam dated April 6, 1836, I quote this letter of Dr. Young's, and remark.

"From this it will be observed that the proportion of sick in hospital to prisoners has been far less than was originally anticipated. I beg to state that I have made this reference, because it goes in a great measure to answer points about which your committee appear anxious to become acquainted; viz. the comfort of convicts in jails. When Dr. Young wrote this the Allipore great jail was just finished. It was to contain prisoners for life, others previous to transportation, and some from the up-country zillahs of a more than commonly turbulent

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character, condemned for a series of years to labor in irons. These were prisoners of all ages, and many arrive at an advanced age. Previous to this period, the convicts did not enjoy the cleanliness and comfort this capacious and airy jail afterwards afforded, and I may add a sufficiently capacious hospital was attached to it, upon illness medical aid was immediately resorted to, and this hospital received all the sick from the two jails and from all the road gangs, and I have continued the same monthly returns that Dr. Young always made to the Sudder Nizamut Adawlut. In the lessened proportion of sick to prisoners will be seen the advantage of good, dry, clean and airy accommodation, but as regards mortality, the Allipore Jail cannot be said to afford a criterion of the rate of mortality among prisoners generally, because it contains an immense number of convicts from the Western Provinces who are confined for life; and vast numbers die in the jail of mere old age."

I further added—"As far as my experience and observation will permit me, after a performance of those civil duties for nearly sixteen years, I will endeavour to afford every information in my power, and I am thus far able to speak with confidence that the prisoners in the Allipore jail are the most stout and healthy of all the prisoners. Many have attained a great age, and are infirm from age only, and many die a natural death; yet I have found at all times the proportion of sick to prisoners small as compared with those from the working gangs. They are better housed and better fed than the others, they nearly all of them eat ata instead of rice, or mix, or change it with rice, which as food is more nutricious; a more liberal allowance of money daily enables them to do this.

"The situation of the jail is particularly healthy, it is very large, dry, and airy, the convicts work in the shade, they have shaded accommodation for cooking their food, and are consequently not exposed to the inclemency of the weather, to the heat, and cold, the sun and rain, to damp and obnoxious malaria, like the men who work upon the roads, with less allowance to purchase their comforts.

"These considerations induce me to think that if some indulgence was shewn to the working gangs, such as being put on the same allowance as those in the Allipore Jail, employing them in some in-door work when the weather was very bad, and always having shaded places wherein to cook their food; in fact, to place them more upon a par with the working classes, there would be much less sickness among this description of convicts than there is at present. I find from my own observation, as well as from the report of the European Overseers, that the up-country convicts support the fatigue of road-working quite

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as well, if not better, than Bengallees, and that they are generally preferred for labor. If the road-gangs could afford to purchase ata, and if some attention was paid to their comforts, I do not think their working on the roads would be detrimental, and I am of opinion that a saving both in life and health would be the result."

The inmates of the Allipore Jail are all of them banished prisoners, generally 1200 in number, and separating them from the rest, and making a comparison of the mortality among them for the last ten years, I find the mortality to be 5¼ per cent. per annum, which is less than the mortality of the prisoners in the Zillah jail and those upon the suburbs roads. I cannot therefore consider that the climate acts very injuriously upon those banished to Allipore for life, though some allowance should be made for the comparative comforts they enjoy, and which I have already remarked upon.

If I am to consider the prisoners who have been sent from the 24-Pergunnahs zillah jail to Burdwan as banished prisoners, they appear to me to have much deteriorated in health since they left this zillah, and the mortality has been great, since out of 113 prisoners who were sent to Burdwan in January last year, 19 died in the year; but whether they have suffered from climate or from any want of attention to their necessary comforts and lodging at night, it is difficult for me to decide with precision. Of the last batch of seventeen who went to Burdwan in January last, two are dead and several have returned in a very weakened state, and are now in the Allipore Hospital; indeed a quarter of the number of the entire prisoners just returned from Burdwan, are sick in hospital. I had reported officially to you on the 12th of January last that these seventeen prisoners all appeared in good health, but that their fetters, each weighing three pounds and a half, and one man's 10 pounds, were too heavy, and you had them changed, and as I find their legs have not suffered from the fetters, this want of health among them must be imputed to some other cause.

In answer to Mr. Adam as to my opinion of the cause of the great sickness and mortality that took place among the different zillah prisoners sent to work on the Burdwan road, and which led to the appointment of the Committee of which he was Secretary, I stated, that—

"Other medical gentlemen who have visited the Burdwan road, will be better able to judge of the cause of the mortality than myself. I have already alluded to malaria as an almost universal cause of sickness; and as to the localities and the physical conditions which combine to render places insalubrious, it would require too much space to enter upon here. Per-

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haps the best way of answering that question will be by stating that filthy tanks, jheels, luxuriant swards, jangal and damp and dewy nights, are among the constant causes of fevers, dysentery, spleen, palsy, and various other diseases, and ought to be guarded against; and I should here state in answer to the question whether I ascribe the above mentioned effects to the influence of climate or to the use of food and water to which the patients were not accustomed, that I am of opinion after many years consideration of such investigation, that generally speaking the occasional use of bad food, or bad water, would go but little way in the production of such diseases, compared with the more extensive cause malaria. No doubt bad food, which would not keep up the strength of a working man, would so reduce him, as to render him more susceptible, but good food will not prevent the effect of this deadly poison upon those exposed to its influence, and such exposure, to great extent, with hard work in fetters in the sun and rain, adopted inconsiderately, would be likely no doubt to cause great mortality, particularly by cholera."

As regarded their confinement by night, I added,

"I think, if the night guard watch properly, there will be no necessity of passing chains through the convicts' legs. This double night-chaining I never saw, but I am satisfied it must be attended with numerous evils, so obvious, that it is unnecessary here to enter into the subject further. This night-chaining of convicts together by the legs, as well as the heavy bar irons in common use, ought, I respectfully submit, to be abolished, as has been the barbarous punishment of the korah, a punishment it has been my painful duty often to witness officially. I am emboldened in these remarks as your committee require my aid as a question of humanity."

I have stated the evils of night-chaining as obvious, because I think it only requires a moment's consideration to see the injurious effects upon the health of the prisoners, their being so linked as to be obliged to lie close together, and often, as I am told, with the absence of all convenience to those who require to get up.

The paragraphs I have copied were written more than a year ago, and I would now wish to add, that the greater number of cholera cases which are exhibited in the table annexed, occurred among the convicts in the zillah jail and those on the roads, and that comparatively speaking very few cases of cholera occur among the prisoners in the Allipore jail; and the observation of this particular circumstance, among other considerations, led me to make the remarks in a former part of the letter, that if some attention was paid to the comforts of the

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road-convicts, it was my opinion that a saving both in life and health would be the result.

A new guard-house is now building in a healthy spot for the Moochekola gang, and I hope I may be allowed to repeat my opinion as expressed in my letters of last year and the year before, that if raised mutchans and well necessaries were adopted in all the road-gang establishments, it would be highly conducive to the health of the convicts.

As regards the necessity of some change of system in the necessaries in the Russapaglah zillah jail, and which I have already brought to the notice of Government, I may state that the superintending surgeon quite agrees with me as to such necessity, and he gives his opinion in favor of the well necessaries; and although these prisoners now are allowed rations instead of money, yet as they have to cook their own food, my opinion is still unaltered that they should have a shady place to cook under upon their return from work.

Considering the mode of constraining prisoners to be of the greatest importance as regards their health it will, I trust, not be considered irrelevant my here repeating what I said to Mr. Adam upon the subject of fetters. I said,—

"The chains, or more properly speaking fetters, those worn formerly by the prisoners of this sudder station, have been of every form, length, kind, and variety, and sometimes extremely heavy, and they were until lately almost all *bar* fetters; and as to the number of ulcers I may have had, I beg to state that in October, November, and December 1832 I had 80, 98 and 65 cases of ulcerated legs at one time in the Allipore hospital. One of these turned out to be fatal, and on other occasions such has been the case: the two previous months, three cases were fatal. The form and construction of chains I would recommend for perfect security, and for the attainment of the greatest amount of labor with the least bodily pain to the convicts will appear from my official correspondence upon that subject with the Sudder Nizamut Adawlut; and in answer to the question about the weight of fetters, I should say that I consider the maximum weight might be 2 pounds, the medium 1 pound and $\frac{3}{4}$, and the minimum 1 pound and a half; perhaps if the medium was adopted as a general regulation chain, it would be better than having three different kinds; the links should be rather long, and 3, 4, or 5, in number, to each leg. From what I have heard of chains being passed through the prisoners legs at night, I consider that the convict is often deprived of the rest and sleep necessary to health. I will endeavour to suggest a mode of building and guarding to avoid this necessity, in another place."

"In my remarks in the last six months returns for 1831, I brought to the notice of the Sudder Nizamut Adawlut the great number of ulcerated legs produced by fetters, and recommended the lightening of them if consistent with safety; and in answer to the Court's letter requesting me to submit a special report on the subject of ulcerated legs among the prisoners, with any suggestions which might seem likely to guard against the evil, I stated my opinion that the sores on the feet and legs of the prisoners did arise in general from the friction of the fetters, and I suggested the use of properly constructed leather or mozehs, to be worn under the rings, and I still more strongly advised the substitution of linked *chain* fetters, in lieu of the long iron bars in general use. I stated my belief that with such chains the prisoners would be able to work better, and with greater ease to themselves, than they can from the inconvenient ~~stretching~~ straddling position they are constrained to adopt in walking and in working caused by the straight iron bars, and that I thought the continued fretting and friction occasioned by these bars would be avoided, or at all events greatly lessened.

"In answer to the Medical Board's circular, I again urged the adoption of the change above alluded to regarding fetters; and some time afterwards having been sent for by Lord Bentinck upon the subject of prisoners, I gave in a memorandum in which with respect to fetters I thus express myself:—'I trust that the Government will be moved to take into consideration the propriety of having chains in lieu of bar fetters for all prisoners, and that one general regulation chain constructed of the best iron, be manufactured under the superintendence of some officer in the service, and sent to the different zillahs, or that a model of the same should be sent, so that no difference may exist as to either the weight, shape, or the quality of the metal: for refractory prisoners double chains of this kind would do no harm, but I have observed the greatest inconvenience arise from the use of bar iron.'

"After this period and in communication upon the same subject with Captain Jenkins the commissioner of Assam, he sent me down a drawing of a chain he proposed, and I believe adopted, which by means of a lock or spring took the chains from one leg of a prisoner, and it was otherwise disposed of while he worked, after which it was again brought on the leg. I cannot exactly recollect the peculiarity of this chain, but I thought it so ingenious that I sent it to the private secretary, who had already procured a model of a link chain. In my answer to the Medical Board's circular above alluded to, I also stated that I thought the greatest grievance prisoners suffered under was their fetters, and I enclosed my correspon-

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dence with the Sudder Nizamut Adawlut upon the subject. I also remarked that I had made a calculation of the number of ulcerated legs and sores, as compared with the sick in hospital at the end of each month for the last eighteen months, ending December 1833, and that I found the proportion as one in three or one-third: I added, that nearly all the irons I had occasion to remove were bar irons, which however light must be a constant hindrance and annoyance to men moving about, or having to walk a considerable distance. I have found a party of prisoners, who had all bar irons, arrive with nearly all of them having ulcerated legs; and in allusion to a central gang of prisoners who had been for many years located behind the general hospital, having a year before been broken up and sent to the Russapaglah jail, I remarked in consequence of having observed great sickness among them, that since their removal, they had to go a great distance to their work, which to men wearing bar fetters must have added greatly, not only to their bodily labor, but to their exposure to the heat of the sun, and to the inclemency of the weather, and must be calculated to affect their general health. In my last January remarks in reference to the 18 months comparison already alluded to, I stated, I have now made a similar comparison for the last 18 months and find the proportion of ulcerated legs as one to twelve only (meaning as compared with the sick in hospital at the end of each month, and including the most trifling sores), which I conceive to be the result of more care and attention being paid to the fetters, but more particularly to the circumstance of chain, instead of bar fetters, being more generally used than before; and in my last six months returns, I stated the number to be about half a dozen at a time in the hospital, and all those sores of a most trifling nature. The bar fetters are injurious in a variety of ways; for instance, after a convict is fatigued with carrying a basket on his head for a long time, he sits down to rest with his knees up, the weight of the bar fetters press the rings down with considerable force on his instep and ankles, and there constantly produce sores or swellings, often of a severe and debilitating description, or such may be caused at night during sleep. The junction of these bar irons to the rings is often badly arranged, not having play enough and this portion of the bar fetters will often do mischief. I cannot think that this mode of making convicts labor is either humane or useful, besides, independent of the loss of the convict's labor while in hospital, he is a considerable expence to the state in medicines, dressing, and increased diet, necessary to keep up and support his emaciated state, which is often fast sinking when ulcers take a bad turn; and I should

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add that the same sores are constantly breaking out again and again, and the patients as often coming into hospital. From inquiries I have made I find chain links are in general use in England, and a gentleman just returned from Van Dieman's Land, says, that chains are universally adopted there. As my opinion is asked as a question of humanity as well as of public improvement and of economy, I would beg to give an important and additional reason for abolishing the use of bar fetters altogether. It is this, that a man long accustomed to the use of such fetters, cannot for a great length of time recover his natural mode of walking, by which he is known to the public as having been a prisoner, which is highly calculated to prevent his obtaining an honest living. Many years ago, the magistrate of Furridpore, in consideration of such awful consequences, both to the liberated prisoners and to the public, adopted the plan of gradually taking off the bars, until at last the prisoners, who were upwards of 1000 in number had, with very few exceptions, only the rings on their legs; only one man made his escape, and he was immediately retaken. This gentleman says that in this he had two motives, one the encouragement of their labor, the other a matter of policy from observing that those released no one liked to employ, as they were marked and conspicuous from their gait for a long time after their release, which this measure effectually did away, and to it he principally attributed their being enabled to get employment."

I am happy to be able to state that for the last month there has not been a case of ulcerated leg in the hospital.

From the details I have given, if we are to look to the effect of climate alone, as forming a criterion of the general health of the prisoners banished to the station of Allipore, I think it will appear that the climate is not unfavorable; and in allusion to what I have said of the old age of many of these prisoners banished for life, I would beg to enclose a list of several prisoners now in the jail, who have attained very advanced ages, some upwards of 80 years and several between 70 and 80 years, and it will also be seen that of these some are natives of the Upper Provinces. I have sometimes noticed in my monthly returns to the Sudder Nizamut Adawlut the old age of some who die; as for instance in my November returns for 1831, I state—"The deaths are numerous this month, and chiefly dysentery, many were very old prisoners and several of very old age, one 90, another 82, another 75, two were 70, and others considerably advanced in years." But it is not to the effect of climate alone, that we are to look, in considering the general health of prisoners in a district. The climate, as I believe this to be, may be as favorable, or more so, than most others in the same part of the country, and yet the returns of the sick amongst the prisoners may be swelled by the various other causes of sickness I have alluded to, and, as in the instances I have given, prisoners in health may be sent from a district and return sick, as those sent from this district to the Burdwan road. My allusion to this, I trust will not be thought irrelevant, when it is considered that they now form a considerable part of the sick under my own charge, and go to make my own returns of sick greater than would otherwise be the case, there being upwards oft wenty of the returned prisoners in hospital, or as about 1 sick to 4 prisoners, while the average proportion of sick for the last sixteen years has been 1 sick to 21 prisoners. This latter remark is also applicable to the returns of sick for those periods when they were increased by the number with ulcerated legs from the irons, a cause of illness quite independent of climate. The prisoners who are just returned from Burdwan were when in this zillah used to some regularity, they were well housed in the Russapaglah jail, and I believe all who chose it were accustomed to fish as part of their food; besides which, they had not their night's rest disturbed by any uncomfortable mode of confinement, therefore it is not easy to say that the climate where they were sent to work, was, alone inimical to these men: if it was the climate alone, the guards ought also to have suffered.

As bearing upon mortality, I have drawn up the annexed table of mortality from authentic sources; that of the natives, I can only procure for the last five years, and from this it will appear that I am borne out in my observation, regarding the effects of the inundations; and the other communities which are for 20 years, shew a greater mortality about the same period: they also shew, in common with the native community, a decrease in mortality, and consequent improvement during the last two years.

Taking into consideration the increase of population, especially that of Europeans, and excepting the peculiar years of the inundations, the general tendency of these tables shew that public health must have improved, and consequently that the climate has rather improved than otherwise. It is true these tables relate to Calcutta, and not to the country around, but if we had similar data to guide us, we might be able to form a more correct opinion of the climate.

I have, &c.
(Signed) F. P. STRONG,
Surgeon 24-Pergunnahs.

18th May, 1837.

Proportion of Sick to Prisoners.

Months.	Proportion of Sick to Prisoners.	Months.	Proportion of Sick to Prisoners.	Months.	Proportion of Sick to Prisoners.	Months.	Proportion of Sick to Prisoners.
1817.		1818.		1819.		1820.	
January, .	1 to 12	January,..	1 to 13	January,..	1 to 12	January,..	1 to 9
February,	1 to 10	February,	1 to 12	February,	1 to 10	February,	1 to 11
March, ..	1 to 10	March, ..	1 to 13	March, ..	1 to 9	March, ..	1 to 11
April, ...	1 to 10	April, ...	1 to 15	April, ...	1 to 10	April, ...	1 to 9
May, ...	1 to 10	May, ...	1 to 15	May, ...	1 to 11	May, ...	1 to 10
June, ...	1 to 9	June, ...	1 to 9	June, ...	1 to 11	June, ...	1 to 10
July, ...	1 to 12	July, ...	1 to 15	July, ...	1 to 14	July, ...	1 to 9
August, ..	1 to 12	August, ..	1 to 14	August, ..	1 to 13	August, ..	1 to 9
September,	1 to 11	September,	1 to 12	September,	1 to 10	September,	1 to 10
October,..	1 to 10	October,..	1 to 10	October,..	1 to 10	October,..	1 to 11
November,	1 to 11	November,	1 to 11	November,	1 to 10	November,	1 to 11
December,	1 to 13	December.	1 to 12	December,	1 to 9	December,	1 to 12
onthly Ann. avrg.	1 to 11	Ann. avrg.	1 to 13	Ann. avrg.	1 to 11	Ann. avrg.	1 to 10.

11
13
11
10 } 45—4—1 sick to 11¼ prisoners.

1821.		1822.		1823.		1824.	
January,..	1 to 12	January,..	1 to 12	January,..	1 to 33	January,..	1 to 19
February,	1 to 13	February,	1 to 15	February,	1 to 33	February,	1 to 20
March, ..	1 to 13	March, ..	1 to 17	March, ..	1 to 33	March, ..	1 to 20
April, ...	1 to 13	April, ...	1 to 16	April, ...	1 to 32	April, ...	1 to 19
May, ...	1 to 13	May, ...	1 to 20	May, ...	1 to 31	May, ...	1 to 18
June, ...	1 to 12	June, ...	1 to 22	June, ...	1 to 27	June, ...	1 to 16
July, ...	1 to 11	July, ...	1 to 20	July, ...	1 to 23	July, ...	1 to 15
August, ..	1 to 11	August, ..	1 to 22	August, ..	1 to 20	August, ..	1 to 13
September,	1 to 11	September,	1 to 25	September,	1 to 17	September,	1 to 14
October,..	1 to 11	October,..	1 to 30	October,..	1 to 23	October,..	1 to 18
November,	1 to 11	November,	1 to 37	November,	1 to 19	November,	1 to 22
December,	1 to 11	December,	1 to 36	December,	1 to 19	December,	1 to 24
onthly Ann. avrg.	1 to 12	Ann. avrg.	1 to 22	Ann. avrg.	1 to 26	Ann. avrg.,	1 to 18.

1825.		1826.		1827.		1828.	
January,.	1 to 21	January,..	1 to 23	January,..	1 to 31	January,..	1 to 32
February,	1 to 19	February,	1 to 24	February,	1 to 26	February,	1 to 31
March, ..	1 to 19	March, ..	1 to 24	March, ..	1 to 26	March, ..	1 to 89
April, ...	1 to 19	April, ...	1 to 23	April, . ..	1 to 11	April, ...	1 to 32
May, ...	1 to 16	May, ...	1 to 21	May, ...	1 to 36	May, .. .	1 to 35
June, ...	1 to 16	June, ...	1 to 22	June, .. .	1 to 31	June, ...	1 to 31
July, ...	1 to 15	July, ...	1 to 22	July, ...	1 to 29	July, ...	1 to 31
August, ..	1 to 17	August, ..	1 to 22	August, ..	1 to 25	August, ..	1 to 30
September,	1 to 18	September,	1 to 21	September,	1 to 22	September,	1 to 28
October,..	1 to 17	October,..	1 to 22	October,..	1 to 26	October,..	1 to 24
November,	1 to 16	November,	1 to 22	November,	1 to 25	November,	1 to 29
December,.	1 to 19	December,	1 to 26	December.	1 to 25	December.	1 to 23
thly Ann. avrg.	1 to 18	Ann. avrg.	1 to 23	Ann. avrg.	1 to 26	Ann. avrg.	1 to 30.

Months.	Proportion of Sick to Prisoners.	Months.	Proportion of Sick to Prisoners.	Months.	Proportion of Sick to Prisoners.	Months.	Proportion of Sick to Prisoners.
1829.		1830.		1831.		1832.	
January,..	1 to 44	January,..	1 to 31	January,..	1 to 20	January,..	1 to 13
February,	1 to 29	February,	1 to 40	February,	1 to 24	February,	1 to 13
March, ..	1 to 28	March, ..	1 to 48	March, ..	1 to 27	March, ..	1 to 13
April, ...	1 to 29	April, ...	1 to 43	April, ...	1 to 23	April, ...	1 to 15
May, ...	1 to 32	May, ...	1 to 36	May, ...	1 to 28	May, ...	1 to 14
June, ...	1 to 31	June, ...	1 to 32	June, ...	1 to 29	June, ...	1 to 14
July, ...	1 to 27	July, ...	1 to 27	July, ...	1 to 24	July, ...	1 to 15
August, ..	1 to 29	August, ..	1 to 20	August, ..	1 to 18	August, ..	1 to 17
September,	1 to 65	September,	1 to 16	September,	1 to 13	September,	1 to 15
October,..	1 to 30	October,..	1 to 20	October,..	1 to 13	October,..	1 to 13
November,	1 to 30	November,	1 to 16	November,	1 to 13	November,	1 to 14
December,	1 to 29	December,	1 to 17	December,	1 to 11	December,	1 to 17
Ann. averg.	1 to 33	Ann. averg.	1 to 29	Ann. averg.	1 to 21	Ann. averg.	1 to 13½

Monthly

Months.	Proportion of Sick to Prisoners.	Months.	Proportion of Sick to Prisoners.	Months.	Proportion of Sick to Prisoners.	Months.	Proportion of Sick to Prisoners.
1833.		1834.		1835.		1836.	
January,..	1 to 20	January,..	1 to 24	January,..	1 to 19¾	January,.	1 to 8
February,	1 to 17	February,	1 to 28	February,	1 to 21	February,	1 to 15
March, ..	1 to 18	March, ..	1 to 32	March, ..	1 to 20	March, ..	1 to 12
April, ...	1 to 17	April, ...	1 to 29	April, ...	1 to 17	April, ...	1 to 13¼
May, ...	1 to 14	May, ...	1 to 30	May, ...	1 to 16	May, ...	1 to 16¾
June, ...	1 to 15	June, ...	1 to 21	June, ...	1 to 15	June, ...	1 to 20½
July, ...	1 to 15	July, ...	1 to 14	July, ...	1 to 15½	July, ...	1 to 14¼
August, ..	1 to 14	August, ..	1 to 11	August, ..	1 to 15	August, ..	1 to 19¾
September,	1 to 13	September,	1 to 11	September,	1 to 14	September,	1 to 18½
October,..	1 to 15	October,..	1 to 12	October,.	1 to 14	October, ..	1 to 18¾
November,	1 to 16	November,	1 to 15	November,	1 to 12	November.	1 to 16½
December,	1 to 18	December,	1 to 17	December,	1 to 14	December,	1 to 16¼
Ann. averg.	1 to 16	Ann. averg.	1 to 20¼	Ann. averg.	1 to 16	Ann. averg.	1 to 15¾

Monthly

12
22
26
18
18
23
26
30
33 } 339½—16—1 sick to 21¼ prisoners.
29
21
13½
16
20¼
16
15¾

CSL

Proportion of Deaths to Prisoners.

Months.	Average Proportion of Deaths to Prisoners.	Months.	Average Proportion of Deaths to Prisoners.	Months.	Average Proportion of Deaths to Prisoners.	Months.	Average Proportion of Deaths to Prisoners.
1817.		1818.		1819.		1820.	
January,..	1 to 146	January,..	1 to 177	January,..	1 to 147	January,..	1 to 61
February,	1 to 159	February,	1 to 171	February,	1 to 267	February,	1 to 147
March, ..	1 to 172	March, ..	1 to 200	March, ..	1 to 151	March, ..	1 to 100
April, ...	1 to 107	April, ...	1 to 495	April, ...	1 to 159	April, ...	1 to 120
May, ...	1 to 132	May, ...	1 to 604	May, ...	1 to 249	May, ...	1 to 121
June, ...	1 to 138	June, ...	1 to 460	June, ...	1 to 251	June, ...	1 to 103
July, ...	1 to 209	July, ...	1 to 268	July, ...	1 to 207	July, ...	1 to 113
August, ..	1 to 181	August, ..	1 to 266	August, ..	1 to 203	August, ..	1 to 202
September,	1 to 106	September,	1 to 259	September,	1 to 126	September,	1 to 156
October,..	1 to 201	October,..	1 to 154	October,..	1 to 91	October,..	1 to 131
November,	1 to 100	November,	1 to 77	November,	1 to 76	November,	1 to 168
December,	1 to 125	December,	1 to 100	December,	1 to 92	December,	1 to 109
Ann. averg.	1 to 148	Ann. averg.	1 to 270¾	Ann. averg.	1 to 160	Ann. averg.	1 to 127.

monthly

148
270¾
160
127
} 706—4—1 death to 176½ prisoners.

Months.	Average Proportion of Deaths to Prisoners.	Months.	Average Proportion of Deaths to Prisoners.	Months.	Average Proportion of Deaths to Prisoners.	Months.	Average Proportion of Deaths to Prisoners.
1821.		1822.		1823.		1824.	
January,..	1 to 81	January,..	1 to 99	January, .	1 to 148	January,..	1 to 147
February,	1 to 164	February,	1 to 258	February,	1 to 164¼	February,	1 to 139
March, ..	1 to 154	March, ..	1 to 145	March, ..	1 to 157½	March, ..	1 to 158¼
April, ...	1 to 175	April, ...	1 to 161	April, ...	1 to 227½	April, ...	1 to 129
May, ...	1 to 282	May, ...	1 to 462	May, ...	1 to 239½	May, ...	1 to 175½
June, ...	1 to 199	June, ...	1 to 617	June, ...	1 to 157½	June, ...	1 to 120¾
July, ...	1 to 100	July, ...	1 to 199	July, ..	1 to 151	July, ...	1 to 175½
August, ..	1 to 89	August, ..	1 to 153	August, ..	1 to 118	August, ..	1 to 184½
September,	1 to 197	September,	1 to 146	September,	1 to 138½	September,	1 to 117¾
October,..	1 to 73	October,..	1 to 99¾	October,.	1 to 100¾	October,..	1 to 431½
November,	1 to 88	November,	1 to 174½	November,	1 to 155	November,	1 to 373
December,	1 to 95	December,	1 to 110½	December,	1 to 153¾	December,	1 to 390
Ann. averg.	1 to 133	Ann. averg.	1 to 217	Ann. averg.	1 to 159¾	Ann. averg.	1 to 228½

onthly

Months.	Average Proportion of Deaths to Prisoners.	Months.	Average Proportion of Deaths to Prisoners.	Months.	Average Proportion of Deaths to Prisoners.	Months.	Average Proportion of Deaths to Prisoners.
1825.		1826.		1827.		1828.	
January,..	1 to 258½	January,..	1 to 70	January,..	1 to 93	January,..	1 to 112
February,	1 to 149¾	February,	1 to 134	February,	1 to 111	February,	1 to 165
March, ..	1 to 84¾	March, ..	1 to 238	March, ..	1 to 51	March, ..	1 to 55
April, ...	1 to 81¾	April, ...	1 to 143	April, ...	1 to 61	April, ...	1 to 188
May, ...	1 to 76½	May, ...	1 to 37	May, ...	1 to 31	May, .. .	1 to 191
June, ...	1 to 148½	June, ...	1 to 94	June, ...	1 to 447	June, ...	1 to 160
July, .. .	1 to 126	July, ...	1 to 101	July, ...	1 to 292	July, ...	1 to 161
August, ..	1 to 88½	August, ..	1 to 74	August, ..	1 to 152	August, ..	1 to 433
September,	1 to 72½	September,	1 to 186	September,	1 to 87	September,	1 to 442
October,..	1 to 146¾	October, ..	1 to 86	October, ..	1 to 56	October,..	1 to 214
November,	1 to 93¼	November,	1 to 192	November,	1 to 74	November,	1 to 227
December,	1 to 373	December,	1 to 92	December,	1 to 94	December,	1 to 131
Ann. averg.	1 to 141	Ann. averg.	1 to 180	Ann. averg.	1 to 196	Ann. averg.	1 to 201

onthly

Months.	Average Proportion of Deaths to Prisoners.	Months.	Average Proportion of Deaths to Prisoners.	Months.	Average Proportion of Deaths to Prisoners.	Months.	Average Proportion of Deaths to Prisoners.
1829.		1830.		1831.		1832.	
January,..	1 to 332	January,..	1 to 495	January,..	1 to 68	January,..	1 to 96
February,	1 to 322	February,	1 to 258	February,	1 to 157	February,	1 to 289
March, ..	1 to 229	March, ..	1 to 181	March, ..	1 to 144	March, ..	1 to 88
April, ...	1 to 111	April, ...	1 to 374	April, ...	1 to 183	April, ...	1 to 175
May, ...	1 to 232	May, ...	1 to 254	May, ...	1 to 102	May, ...	1 to 190
June, ...	1 to 277	June, ...	1 to 153	June, ...	1 to 147	June, ...	1 to 331
July, ...	1 to 179	July, ...	1 to 261	July, ...	1 to 233	July, ...	1 to 507
August, ..	1 to 293	August, ..	1 to 157	August, ..	1 to 147	August, ..	1 to 143
September,	1 to 231	September,	1 to 195	September,	1 to 129	September,	1 to 153
October, .	1 to 486	October,..	1 to 63	October, .	1 to 53	October,..	1 to 103
November,	1 to 372	November,	1 to 52	November,	1 to 67	November,	1 to 79
December,	1 to 24	December,	1 to 75	December,	1 to 90	December,	1 to 69

Ann. averg. 1 to 265 Ann. averg. 1 to 210 Ann. averg. 1 to 126 Ann. averg. 1 to 185.

Monthly

1833.		1834.		1835.		1836.	
January,..	1 to 172	January,..	1 to 69	January,..	1 to 93	January,..	1 to 200
February,	1 to 170	February,	1 to 256	February,	1 to 312½	February,	1 to 222
March, ..	1 to 83	March, ..	1 to 178	March, ..	1 to 201	March, ..	1 to 191
April, ...	1 to 197	April, ...	1 to 154	April, ...	1 to 156	April, ...	1 to 237
May, ...	1 to 274	May, ...	1 to 239	May, ...	1 to 144	May, ...	1 to 305
June, ...	1 to 302	June, ...	1 to 211	June, ...	1 to 247	June, ...	1 to 256
July, ...	1 to 198	July, ...	1 to 70½	July, ...	1 to 336	July, ...	1 to 276
August, ..	1 to 95	August, ..	1 to 117	August, ..	1 to 251	August, ..	1 to 171
September,	1 to 84	September,	1 to 10½	September,	1 to 222	September,	1 to 222
October,..	1 to 60	October,..	1 to 68	October,..	1 to 263	October,..	1 to 156
November,	1 to 66	November,	1 to 94	November,	1 to 265	November,	1 to 131
December,	1 to 76	December,	1 to 87	December,	1 to 189	December,	1 to 170

Ann. averg. 1 to 148 Ann. averg. 1 to 129 Ann. averg. 1 to 223 Ann. averg. 1 to 211,

Monthly

133
217
159¼
228½
141
180
196
201
265
210
126
185
148
129
223
211

} 3052¾—16—1 death to 190¾ prisoners.

The number of Prisoners attacked by Cholera, and the proportion of Deaths to those attacked.

Months.	Number of Prisoners.	With Cholera.	Died.	Months.	Number of Prisoners.	With Cholera.	Died.	Months.	Number of Prisoners.	With Cholera.	Died.	Months.	Number of Prisoners.	With Cholera.	Died.
1817.				1818.				1819.				1820.			
Jan. ..	2780	30	2	Jan.....	2475	22	2	Jan.....	2175	8	1	Jan.....	1832	37	8
Feb. ..	2852	51	3	Feb.....	2415	50	10	Feb.....	2139	21	1	Feb.....	1903	16	1
March,	2745	53	0	March,	2399	56	5	March,	1961	19	2	March,	1996	23	6
April, .	2770	54	3	April, .	2467	33	0	April, ..	1936	7	6	April, .	1921	50	7
May, ..	2700	31	1	May, ..	2423	21	0	May, ..	1995	20	1	May, ..	1940	55	9
June, ..	2721	12	0	June, ..	2401	8	1	June, ..	1967	12	1	June, ..	1831	47	3
July, ..	2668	29	2	July, ..	2407	17	2	July, ..	2068	10	3	July, ..	1807	43	3
Aug. ..	2535	56	5	Aug. ..	2796	15	1	Aug. ..	2029	17	4	Aug. ..	1821	35	4
Sept. ..	2621	82	4	Sept. ..	2223	13	1	Sept. .	2014	43	0	Sept. ..	1700	24	3
Oct.....	2707	26	1	Oct.....	2317	11	1	Oct.....	1912	44	4	Oct.....	1705	22	3
Nov. ..	2612	52	5	Nov. ..	2324	36	4	Nov. ..	1888	41	8	Nov. ..	1681	21	1
Dec.....	2510	37	1	Dec.....	2258	25	5	Dec... .	1843	43	4	Dec.. ..	1750	18	2
		513-27				308-32				285-36				391-53	
		1 to 19				1 to 9½				1 to 8				1 to 7¾	

19
9½
8
7¾

43¾—4— 1 death to 11 cases of cholera.

1821.				1822.				1823.				1824.			
Jan.....	1816	21	3	Jan.....	1795	31	11	Jan.. ..	1629	24	3	Jan.....	1481	17	0
Feb.....	1809	25	4	Feb.....	1805	55	3	Feb.....	1644	16	1	Feb.....	1529	26	2
March,	1832	22	2	March,	1879	75	1	March,	1595	23	0	March,	1426	25	5
April, ..	1927	19	4	April, ..	1799	94	0	April, .	1593	14	1	April, .:	1375	34	1
May, ..	1974	28	2	May, ..	1848	65	1	May, ..	1635	19	0	May, ..	1403	31	1
June, ..	1995	29	3	June, ..	1851	45	1	June, ..	1571	40	2	June, ..	1328	32	2
July, ..	1894	31	1	July, ..	1889	18	1	July, ..	1511	29	3	July, ..	1228	24	0
Aug. ..	1778	28	2	Aug. ..	1681	40	3	Aug. ..	1416	25	0	Aug. ..	1293	58	0
Sept. ..	1772	27	2	Sept. ..	1612	37	1	Sept. ..	1386	42	3	Sept. ..	1290	36	0
Oct.....	1762	24	2	Oct.....	1597	7	2	Oct.....	1404	36	3	Oct.....	1295	30	0
Nov. ..	1759	19	2	Nov. ..	1571	8	1	Nov. ..	1394	27	2	Nov. .	1491	46	1
Dec.....	1762	18	0	Dec.....	1544	23	4	Dec.....	1385	23	2	Dec. ..	1559	55	0
		291-27				496-29				318-18				414-12	
		1 to 10¾				1 to 17				1 to 17½				1 to 34½	
1825.				1826.				1827.				1828.			
Jan.....	1599	31	0	Jan....	1117	3	1	Jan.....	1179	21	0	Jan.....	1227	28	2
Feb.....	1498	34	3	Feb.....	1137	41	3	Feb. ...	1212	34	1	Feb.....	1153	30	1
March,	1434	37	1	March,	1138	33	0	March,	1116	43	1	March,	1260	32	14
April, ..	1463	26	0	April, ..	1161	39	1	April, ..	1153	38	2	April, ..	1299	59	7
May, ..	1249	26	0	May, ..	1129	59	9	May, ..	1226	51	12	May, ..	1338	81	3
June, ..	1187	20	0	June, ..	1142	57	1	June, ..	1232	36	1	June, ..	1304	32	3
July, ..	1139	40	1	July, ..	1148	27	0	July, ..	1298	24	1	July, ..	1287	64	0
Aug. ..	1151	67	5	Aug. ..	1138	21	0	Aug. ..	1304	47	2	Aug. ..	1298	31	0
Sept. ..	1051	87	3	Sept. ..	1157	24	1	Sept. ..	1210	36	1	Sept. .	1327	17	0
Oct.	1173	45	1	Oct.....	1177	31	1	Oct.....	1271	34	2	Oct.....	1287	13	0
Nov. ..	1122	44	4	Nov. ..	1113	27	0	Nov. ..	1242	40	1	Nov. ..	1365	8	2
Dec. ...	1088	25	1	Dec.....	1140	29	0	Dec.....	1198	40	0	Dec.....	1309	3	0
		482-19				419-16				444-24				398-32	
		1 to 25¼				1 to 26				1 to 18				1 to 12½	

Months.	Number of Prisoners.	With Cholera.	Died.	Months.	Number of Prisoners.	With Cholera.	Died.	Months.	Number of Prisoners.	With Cholera.	Died.	Months.	Number of Prisoners.	With Cholera.	Died.
1829.				1830.				1831.				1832.			
Jan.....	1327	2	0	Jan.....	1486	12	0	Jan.....	1474	25	4	Jan.....	2219	6	1
Feb.....	1289	4	0	Feb.....	1552	11	0	Feb.....	1575	14	0	Feb.....	2013	4	1
March,	1376	10	1	March,	1457	9	3	March,	1586	5	0	March,	1924	2	0
April, ..	1330	21	2	April, ..	1497	6	2	April, ..	1651	8	1	April, ..	1909	3	0
May, ..	1395	13	0	May, ..	1536	7	1	May, ..	1632	10	0	May, ..	1944	2	0
June, ..	1386	3	0	June, .	1536	8	2	June, ..	1619	0	0	June, ..	1984	1	0
July, ..	1434	8	1	July, ..	1564	14	0	July, ..	1635	7	0	July, ..	2227	3	0
Aug. ..	1466	6	0	Aug. ..	1573	13	3	Aug. ..	1615	4	0	Aug. ..	2047	2	0
Sept. ..	1386	9	0	Sept. ..	1566	18	2	Sept. ..	1545	10	1	Sept. ..	1706	0	0
Oct.....	1459	7	1	Oct.....	1553	16	1	Oct.....	1531	25	6	Oct.....	1964	7	0
Nov. ..	1487	10	1	Nov. ..	1521	43	10	Nov.. ..	1949	15	2	Nov.. ..	2153	10	2
Dec. ..	1886	5	2	Dec. ..	1889	29	1	Dec. ...	2081	9	1	Dec.. ..	1909	16	4
		98-8				186-25				132-14				56-8	
		1 to 12				1 to 7½				1 to 9¾				1 to 7	

Months.	Number of Prisoners.	With Cholera.	Died.	Months.	Number of Prisoners.	With Cholera.	Died.	Months.	Number of Prisoners.	With Cholera.	Died.	Months.	Number of Prisoners.	With Cholera.	Died.
1833.				1834.				1835.				1836.			
Jan.....	2067	11	1	Jan.....	2322	7	0	Jan.. ..	2109	7	0	Jan.....	1806	6	0
Feb... .	2118	11	4	Feb.....	2307	3	0	Feb.....	2188	5	0	Feb.....	1776	8	1
March,	2372	30	11	March,	2347	6	2	March,	2211	13	2	March,	1720	7	0
April, ..	2170	37	1	April, ..	2154	7	2	April, ..	2037	12	1	April, ..	1894	12	0
May, ..	1918	19	1	May, ..	2147	13	1	May, ..	2035	13	3	May, ..	1829	11	0
June, ..	2117	21	0	June, ..	2111	9	1	June, ..	2225	16	1	June, ..	1796	9	1
July, ..	1982	16	1	July, ..	1988	7	3	July, ..	2118	15	0	July, ..	2103	15	1
Aug. ..	1991	12	1	Aug. ..	1872	9	0	Aug. ..	2013	22	0	Aug. ..	2024	15	2
Sept. ..	2037	13	4	Sept. ..	1879	11	4	Sept. ..	2002	22	0	Sept. ..	1869	1	0
Oct.....	2217	19	4	Oct....	1896	10	2	Oct.. ..	1843	14	0	Oct.....	1873	5	0
Nov.. ..	2087	11	3	Nov.. ..	1785	12	1	Nov.. ..	1836	12	0	Nov.. ..	1706	7	1
Dec. ...	2209	10	5	Dec.. ..	1913	9	2	Dec.....	1883	12	0	Dec.. ..	1876	9	1
		210-36				103-18				163-7				107-7	
		1 to 5¾				1 to 5¾				1 to 23¼				1 to 15	

10¾
17
17½
34½
25¼
26
18
12¼ } 247¼—16—1 death to 15⅓ cases of Cholera.
12
7½
9¾
7
5¾
5¾
23¼
15

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List of Old Diamul prisoners in Allipore Jail.

Number.	Names.	Zillah.	Ages.	Date of reception in Allipore Jail.
1	Bhojah, ...	Banaha, ...	60	7th January, 1814.
2	Goburdhun,......	Hugley, ...	55	1st April, 1812.
3	Bocoo,..........	24-Pergunnahs, ..	60	5th January, 1831.
4	Horee Baugh,....	Hugley, ...	70	23rd September, 1813.
5	Banoonoth,......	Midnapore,.. ...	85	8th June, 1812.
6	Ahnor Kha,......	Mymunsing, ...	70	18th December, 1813.
7	Badoollah Phoker,	Jessore, ...	70	8th September, 1810.
8	Sahamamud, ...	Bakergunge, ...	65	12th October, 1828.
9	Kasoree,........	Rungpore, ...	70	19th November, 1813.
10	Kenoo Mytee,....	Mednipore,......	60	8th June, 1812.
11	Ramdeal,........	Jerut, ...	60	13th August, 1824.
12	Ramsoney, ...	Ditto, ...	70	Ditto ditto,
13	Madaree,........	Bandha, ...	75	7th January, 1814.
14	Lallee,..........	Allahabad, ...	75	5th November, 1813.
15	Harow, ...	Rungpore, ...	80	9th August, 1815.
16	Radha,..........	Conpore,........	80	27th August, 1814.
17	Maghan, ...	Shajahanpore, ..	70	10th June, 1834.

The above are a few of the aged prisoners to shew that some have been inmates for many years, and others arrive very old.

Mortality among all classes in Calcutta for 20 years, but for the Native Population only 5 years.

Years.	Protestant burials.	Scotch burying-ground began 1826.	Catholic burials, D. Rozario.	Catholic burials, Boitockanah.	Greeks.	Armenians.	Indo-Armenians.	Native Christians.	Natives.	
1817	216		313	169	4	10	3			
1818	272		211	159	2	20	3			
1819	275		284	158	0	23	3			
1820	281		282	136	0	17	1			
1821	246		277	172	0	16	3			
1822	324		294	140	0	16	2			
1823	270		277	156	0	10	2			
1824	278		282	188	0	21	1			
1825	297		285	154	1	12	10			
1826	275		309	145	2	19	17		Native Deaths for 5 years.	
1827	254	11	308	174	0	15	16	4	Hindu, .. 8,299	
1828	256	19	250	170	2	15	12	3	Mussulman, 1,009	9,308 in 1832.
1829	184	21	209	146	3	12	16	2	Hindu, . 15,138	
1830	224	26	236	138	1	14	15	0	Mussulman, 2,385	17,523 in 1833.
1831	186	29	236	122	3	17	19	8	Hindu, .. 11,167	
1832	217	25	269	121	1	17	16	1	Mussulman, 1,900	13,067 in 1834.
1833	302	30	288	204	2	23	14	5	Hindu, .. 6,873	
1834	281	35	257	199	2	16	17	4	Mussulman, 1,229	8,102 in 1835.
1835	232	18	233	115	1	7	16	4	Hindu, .. 6,366	
1836	197	26	188	104	0	15	13	3	Mussulman, 1,515	7,881 in 1836.
	5065	240	5288	3070	24	315	199	34		55,881
	20	10	20	20	12	20	20	9		5
Avg.	253	24	264	153	2	15¼	10	3⅓		11,178

Statement of the average rate of mortality per cent. among the different classes of inhabitants in Calcutta per census and table of mortality.

Denominations.	No. of Inhabitants.	Total.	Average mortality per ann.	Average mortality per cent.	
English,	3,138				6⅓ pr. ct.
Eurasians,	4,746	7,884	277	3½ pr. ct.	
Portuguese,	3,181				
French,	160	3,341	417	12½ pr. ct.	
Western Mahomedans,	13,677				
Bengal Mahomedans,	45,067				
Moguls,	527				
Arabs,	351	59,622	1,607	2¾ pr. ct.	
Western Hindus,	17,333				
Bengal Hindus,	1,20,318				
Mugs,	683				
Low Castes,	19,084	1,57,418	9,558	$6\frac{1}{12}$ pr. ct.	
Armenians,		636	25¾	$4\frac{1}{21}$ pr. ct.	
Native Christians,		49	3½	6¾ pr. ct.	
Chinese,		362			
Jews,		307			
Parsees,		40			
Madrassees,		55			

The great difference in mortality between the Hindus and Mussulmans is striking, while the difference to be observed between the Portuguese as compared with the English and the Eurasians, is equally so.

Here is much room for speculation, and it cannot be said that as yet we have as good means of getting correct information upon this subject as they possess in Europe, nevertheless, we may approach as near as we can to the point we wish to ascertain, and we may hope to improve in such statistical records.

The Portuguese among whom so great a mortality is shewn, are a suffering race, greatly subject to the catalogue of complaints enumerated in these papers; while the English and Eurasians are far more prosperous in life, and enjoy comforts and happiness in a very high degree, as compared with the former section of society,—the mortality of the English and Eurasians 3½ per cent. per annum, while that of the Portuguese being 12½ per cent. is very great. In 1830, I ascertained and published in the Gleanings of Science the burials in Calcutta of Protestant Christians from the year 1820. To shew at that time, that although the European population must have greatly increased, yet that the deaths and burials had not increased, and now that the same population is acknowledged to have increased very materially indeed, yet we see upon referring to the first column of one of the tables, giving the protestant burials for the last 20 years, no increase of deaths. The years 1833-4, the two years following the three sea inundations, shew the greatest mortality of late years, while among the native population those two years shew an *extraordinary* mortality. The two last years shew that in both European and native population healthiness is restored. The mortality among the other columns of sections of society, the Catholic, Greek, Armenian, Hindu-Armenian, and native Christians, are for the last 20 years, and I believe them to be nearly correct. The Chinese, and the Jews, keep no account of their burials, I of course could not include them, and they form a small portion of society in this city. The census is the one last taken by Captain Birch, and he took great pains to make it as correct as possible.

No. 6, 1828.—*Letter to Sudder Nizamut Adawlut on the state of grounds near the Insane Hospital, and generally throughout the suburbs; pointing out the general unhealthiness produced by their janglí and filthy state, with additional remarks made at a later period on the effects of the inundations.*

It will be seen that the number of Deaths in the Insane Hospital in these six months has been only 10, a number considerably less than has been usual during the same period for the last 12 years. It appears to me that this advantage has been produced by the making of four sunken and covered necessaries, the nuisance having previously been conveyed by an open drain from the hospital and round the grounds.

I have the pleasure also to report that there has since been much less illness than usual, which I consider mainly attributable to the improvement and change above alluded to. I beg leave, however, to remark that the grounds contiguous to, and outside of the hospital premises, are in my opinion a most unwholesome nuisance, particularly during the rainy season, the water not being drained off, but lying in the various hollows, there stagnates; and corrupting all vegetable and animal matter it meets with, produces an atmosphere most unwholesome even to natives who are used to it.

There is also close to the entrance gate a burying-ground which brings together dogs, vultures, &c. which of themselves are a considerable nuisance, and upon which grounds the prisoners from the jail of the 24-pergunnahs are daily taken in a body for their necessary occasions. Were they to be taken nearer to

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the nullah to which this ground adjoins or elsewhere for such purposes, and the practice of burying discontinued at that place, it would be not only desirable but would conduce to the healthiness of the hospital.

While remarking on the state of the grounds near the hospital it may not be irrelevant for me to observe, that having for upwards of twenty years applied my attention particularly to atmospheric causes of disease, and having now for several years been surgeon of the suburbs of Calcutta, I may not be going far, if at all, out of my line of duty in pointing out that I consider much of the unhealthiness of the suburbs, as well as of Calcutta during and after the rains, to arise in a great measure from the state of the lands in the suburbs immediately round about the town, but more particularly in the Soorrah, Entally, and Balleegunge part of the suburbs. The lands bordering upon these parts, especially to the eastward, are not only more covered with jangal and decaying vegetable matter than elsewhere, but in almost every part of them numerous irregular excavations are to be met with, made for brick-making, and for similar purposes. In these various holes and cavities impure air is generated by the decay and putrefaction of vegetable matter in water, and if impure air so produced is, as it is known to be, capable of causing fever and dysentery, it is not unfair to conclude that certain modifications of this malaria may also be the cause of cholera, which disease predominates in those climates and soils in which fever and dysentery abound. That it may be so produced, is I think sufficiently obvious by the wellascertained fact, that ship's crews in a state of perfect health and a considerable distance, even some miles from the shore, have by a sudden land wind coming on been fatally attacked by the scourge. A striking instance of this nature is recorded by Dr. Macculloch in his very valuable work lately published on the subject of Malaria, a work entitled to the particular attention of medical men and others in this country which is so pregnant with this source of disease. I will here add that I can name at this moment several families about Entally where the whole family are laid up with fever produced most indisputably by the impure air generated about their neighbourhood, by the decomposition or decaying of vegetable subtances, and several are now removing up to Chinsurah and to other places, their removal being more conducive to their recovery than any medicine they can take while they continue to breathe this atmospheric poison.

(Signed) F. P. STRONG,
Surgeon to Suburbs of Calcutta.

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Copy from the 9th Paragraph of my Letter to the Medical Board, dated March 21*st*, 1835.

The same patients (alluding to the patients of the Native Insane Hospital) after being discharged apparently cured, coming into the hospital again and again from obviously unhealthy localities, and other considerations connected with unhealthy situations which would embrace too much space to enter upon at large in this Report, tend to confirm me in my opinion that in the climate of this part of Bengal, atmospheric malaria, aided by the sudden variations in the temperature of the air, and consequent sudden check to perspiration,—by bad food, poverty, miserable clothing, and housing in huts crowded together in swampy filthy situations, with a want of cleanliness and ventilation,—by the habits of long fasting and the use of impure water, (this being the usual mode of existence among the lower orders of natives,) is highly calculated to produce diseases which often ultimately end in insanity.

This general cause of disease which so much predominates in the suburbs of Calcutta, I forcibly brought to the notice of the Sudder Nizamut Court in the year 1828. About this time I was requested to wait upon the Governor General, and I afterwards wrote several papers upon the subject to his Lordship, in which I entered into an explanation of what I conceived to be the principal causes of unhealthiness in Calcutta, its neighbourhood, and the lower part of Bengal. In doing this I was naturally led to make some remarks upon those great sources of malaria, the Salt-water Lake and the janglí Sundarbans adjoining, considering that the draining of the one, and the clearing of the other would be a great public benefit, if even done only with a view of removing such causes of malaria and consequent illness.

In some of the unhealthy spots, but particularly that broad belt of dense jangal and ill drained ground, which exists from the Dum Dum road, and is continued through Sealdah, Entally, Balleegunge, Bhawanipore and down the Russapuglah roads, reside a vast number of people of all denominations connected with the city of Calcutta, and who are constantly suffering from illness, which I conceive might be in a great degree obviated by removing such evils by a proper system of large clean tanks, with no trees upon their banks, raising the ground, regulations against nuisances, and good draining. Were this or some similar plan adopted, we should get air more fresh and free, and a healthiness would I think be obtained that does not now exist.

In one of these papers I have alluded to as having formerly written, I particularly mentioned that the year 1828 was a more healthy year than any I had known ; I did not then anticipate that the following years would have been so calamitous*.

The last five years, the period for which the Medical Board require to be furnished with the details before alluded to, have unhealthy to a degree unheard of or unknown before, owing no doubt to the inundations which have extensively existed to an unprecedented degree, particularly in the four last years, an inundation having occurred in each year sweeping away a great part of the population between parts of the 24-Pergunnahs to the southward of Calcutta and the sea, and spreading over other lands to an enormous extent, destroying the cattle, and the produce of the earth, which has not yet recovered from its effects. Most of the wretched inhabitants of these before populous districts who were not drowned, fled towards our city, and several of these unfortunate beings became inmates of the Insane Hospital. One instance in particular I would wish to be allowed to refer to, as it is a strong case in illustration of the deep distress that must have been felt, and as exemplifying one of the causes of insanity.

The establishment at Gurriah-haut for affording them relief having been some time broken up, these poor unfortunate and starving wanderers were sent to my hospital at Allipore, where I had frequently 60 or 80 of them at a time in hospital. One poor woman was quite frantic ; she would not be comforted or silenced, and becoming obviously insane, she was transferred to the Insane Hospital last December. There she would take no nourishment, she said the floods had robbed her of her children, and she died in a few days of extreme exhaustion†.

Three of these inundations in the lower parts of Bengal to which I have referred were from the sea, and the other, the last, was produced by the overflowing of the Damoda river. These particular floodings, I mean the sea and the Damoda river, are unfrequent when compared with the overflowings of the Ganges, which are more frequent, and seldom attended with equally serious consequences. It will be seen by a reference to the transactions of the physical class of the Asiatic Society, page

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* The paper was written in July, 1829. For a short period about the middle of the year 1828, there was a good deal of fever in the Entally suburbs, but the following twelve months were healthy.

† September 21, 1833. I was asked by the magistrate, Mr. Barlow, to suggest any means for arrangements, so many prisoners and paupers being sick, he did not know how to lodge them, to which on the 22nd I replied, that "if the paupers increased greatly the old Bhawanipore guard, into which we put the Nazir's people with evident advantage might be available upon this occasion," and I recommended the removal of convalescent ulcers to the jail to make room for paupers in the hospital while the guard was getting ready.

260, part 1,—"That an inundation of the sea, or of the Damoda river is supposed not to happen oftener than once in a century." That remark is in allusion to the dreadful inundation in 1823, and I can find no other account of any sea inundation except the eventful one of nearly a century ago, which happened in the night between the 11th and 12th October, 1737, to be found in the Gentleman's Magazine 1738-9 : besides great damage to shipping and boats, 300,000 souls are said to have perished.

I know of no written record as to the effect of this sea inundation upon the health of the inhabitants, although it was an event sufficiently remarkable to be handed down from father to son, and I have met with old natives who have heard of it from their fathers. But of the late inundations which I allude to, their effects are so generally known that it is unnecessary for me to dwell upon them, although I may be allowed to add from inquiries I have made that these effects have not been confined to the poor alone, but that landholders of respectability and their families have been carried off by disease, and this over a vast extent of populous country, and particularly so in parts bordering on our south and southeast suburbs of Calcutta ; and great numbers of these zemindars who fled to Bhawanipore, and to this city for change of air and medical attendance, died of the diseases produced in their villages. In corroboration of what I have stated as to the general unhealthiness produced by the inundations and the consequent impure atmosphere, I beg leave to mention a few particular examples which I have learnt. One native gentleman of wealth assures me that his property has been greatly increased by the numerous deaths in his family ; and another old gentleman has often enumerated to me the dreadful mortality which has deprived him of all those relations of his who lived beyond Gurriah-haut, about Barriepore. Another native who is interpreter to the Mysore Princes named Nilcomul Bonnerjee, who resides at Bhawanipore, writes me that his wife a few days after the inundation of 1833, went to her father's at Barro, a village three coss south of Barriepore, in a pregnant state, and found two, three and four persons die every day at each house ; that they wanted hands to bury the dead ; that in two or three days her mother, brother, aunt, uncle and nine near relations died, she was confined, and there was no one to look after her. The writer on hearing this sent three women and four servants, they all returned ill to his residence, and with exception of his wife and child, they all died in a week. Ever since his wife has been ill with fever and spleen until lately cured. He states that at this time the number of children daily sold by destitute parents in the 24-Pergunnahs is enormous.

I have a letter before me signed by the old gentleman, he writes—"In confirmation of the truth of Nilcomul Bonnerjee's letter, I can say that I had thirty relations residing in the neighbouring villages in 1832-3: only one boy is now living, but ill with spleen, out of all these relations. A great number of respectable families suffered, as Cossinauth Mullick, Bhagwan Chowdry and others of opulence and respectability. The first and twenty others (being the whole of his family), all died except one girl; and the last and about eleven in family all are dead but one boy who ran away to his uncles. This misfortune was almost universal."

It would not be difficult to add many similar examples, all equally proving the wide spread devastation and death caused by the flood and the impure atmosphere; and I have given the above information in the same detailed manner as I have heard it to shew the vast extent of general mortality. Many must have been lost in obscurity, for when we see families possessing the necessaries and comforts of life suffering to so great an extent, it may readily be conceived how great must have been the sufferings of the poor, abject and starving.

Copy of the 9th paragraph of my letter to the Medical Board, dated January 27th, 1834.

There are in more distant parts of the suburbs, guards or depôts of prisoners who are not so comfortably provided for as those in the jails, and I have sometimes had occasion to remark upon their unhealthiness, particularly the one at Garden Reach, which was situated in the midst of drains, and from which five cases of cholera came into the hospital in four days. The Nazir's guard situated in Kidderpore was so unhealthy in the last quarter of 1832 that fourteen cases of most malignant cholera came into the hospital from that guard in less than a week, as was noticed in my returns.

(Signed) F. P. STRONG.

Both these places are now much improved.

No. 7.—Letter to Major Benson returning the late Dr. Buchanan's papers, and sending for the information of the Governor General, some papers written by Capt. Jenkins.

To Major BENSON,
My. Secy. to the Governor General.

My dear Sir,

Pray accept my best thanks for the papers on the means of promoting the health, comfort and convenience of the inhabitants of this city, which I now return with many apologies for keeping them so long. Not trusting my own judgment re-

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garding the nuisances of the town, I sought the opinion of Captain Jenkins who has written some papers on several of the nuisances, and proposed to remedy some, and with his permission I enclose them for the perusal of the Right Honorable the Governor General. I will only in this place venture to express a hope that when the new eastern canal is finished, that the levels of Calcutta will be efficiently taken, and something in the way of draining the town done.

Regarding the suburbs the paper marked No. 21 exhibits a deranged state of things similar to what now actually exists. Many of the recommendations there suggested to drain and level the grounds about Kidderpore where the stagnant water is represented as being injurious to persons residing in that neighbourhood and on the grounds both on the right and left of the Allipore road, just beyond the bridge, now particularly apply. It is also there stated, that the grounds behind the General Hospital had been represented as having been injurious to the invalids in hospital, a road is proposed to be made from this part towards Bhawanipore, or the Russapaglah road, and one crossing this from near the hospital southward to Kalighaut, and it is remarked that these roads would be of material consequence to the natives. A cut also from Tolly's nullah behind the General Hospital is suggested. If such cut or canal was made to join the new eastern canal now nearly finished in the north-eastern division of the suburbs, it would of course be extremely desirable for the drainage of Chowringhee, and all that part of the city; the bad state of drainage, jangal and swamps throughout the suburbs, and particularly down the Russapaglah road I have already brought to the notice of the Governor General, and must not now intrude further upon his Lordship's valuable time, but subscribe myself with many thanks to you,

Yours, &c.

4th October, 1830. (Signed) F. P. STRONG.

No. 8.—Letter from Major Taylor calling on me to attend a committee at the Government house on draining Calcutta, the Lake, &c.

To Dr. STRONG.

MY DEAR SIR,

The Governor General has desired me to request you to meet the gentlemen named in the margin* at the Government house

*D. McFarlan, Esq.
R. D. Mangles, Esq.
Capt. Steel,
Dwarkanath Tagore,
Col. Galloway,
— Hoseason, Esq.
J. Kyd, Esq.
Capt. Fitzgerald,
Ramcomal Sein,
Col. Tickall, C. B.
J. R. Colvin, Esq.
J. Prinsep, Esq.
Capt. J. Thomson,
Capt. Forbes.

on Tuesday next at half-past two o'clock P. M. for the purpose of considering the drainage of Calcutta in connection with the present circular canal, and the project of extending it round the Salt-water Lake into the deep water channel at Bhamunghatta, together with the drainage and silting up of the Salt-water Lake.

Yours, &c.

Govt. House, 27th December, 1834. T. W. TAYLOR.

No. 9.—Letter to Mr. Mangles transmitting some of my papers.

To R. D. MANGLES, Esq.
Secretary to the Government.

SIR,

It affords me considerable pleasure to observe that the Medical Topography of this city, and its suburbs, is exciting attention, and as it is likely that this subject in connection with the fever hospital may be brought before the Government, I feel it is some degree incumbent on me from the situation I hold, to forward to you, to be laid before Government whenever the subject may be brought to their attention, some papers, shewing that so long ago as the year 1828, I had addressed the Sudder Nizamut Adawlut, as well as the Right Honorable Lord William Bentinck, and on a later occasion, the Medical Board, upon the same subject, and it will give me great satisfaction to find that some active measures of improvement result from the present discussion.

I am, &c.

Calcutta, June 18th, 1835. (Signed) F. P. STRONG.

No. 10.—Acknowledging their receipt.

To DR. F. P. STRONG.
Assistant Surgeon of the 24-Purgunnahs.

SIR,

I am directed by the Honorable the Governor of Bengal to acknowledge the receipt of the interesting papers to which your letter of the 18th instant gave cover, and to assure you that your opinions will not be overlooked when the matters to which they relate come under the consideration of Government.

I am, &c.

(Signed) ROSS D. MANGLES,
Secretary to the Government of Bengal.

Fort William,
the 23rd June, 1835,

Census of the Population in the Suburbs of Calcutta.

Names of Thannahs.	No. of Villages.	No. of Mehals.	Resident Hindu adults.	Hindu Children.	No. of Hindus in Service.	Resident Mussulman adults.	Mussulman Children.	No. of Mussulmans in Service.	Native Lodgers or Passengers.	European Adults.	European Children.	East Indian adults.	East Indian Children.	Total Inhabitants.
Thannah Sulkeah, ...	132	258	33,223	20,342	*8,106	12,154	4,395	*2,019	3,153	43	24	63	49	73,446
Ditto Chitpore, ...	8	33	14,177	5,286	984	1,627	601	199	875	23	7	53	1	22,650
Ditto Manicktulah, ...	31	42	20,627	6,173	30,100	13,201	9,661	3,098	3,883	441	67	759	123	54,935
Ditto Tauzeeraut,......	29	84	22,032	5,349	1,120	8,601	2,755	647	5,072	54	15	45	27	43,950
Ditto Nowhazaree,......	1	28	8,465	2,689	799	5,845	2,214	987	2,818	63	3	50	65	22,212
												Grand Total,		217193

* The columns are not included in that of the Total.

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No. 11.—*Letter to Magistrate of 24-Pergunnahs on Census of the Zillah.*

To A. SCONCE, Esq.
Magistrate of the 24-Pergunnahs.

Sir,

I havethe honor to enclose for your information a copy of a letter which I have this day received from the Medical Board, requiring my opinion in a statistical point of view.

To enable me to come to some conclusion upon the subject, I have already obtained from different quarters to be relied upon, the mortality within the city among the different sections of society, for the last twenty years. But with regard to the suburbs, and the 24-Pergunnahs, I have only been able to obtain the mortality among the prisoners for that period.

I am aware that a census was not long ago taken by the sergeants in the suburbs, of the population within that portion of the district, but I fear from inquiries I have made, that it is not very accurate, and I am told that a more accurate one, including also the deaths and births, and distinguishing the Hindus and Mussulmans, might be obtained if you were to issue a purwannah to the heads of villages, who I am told are designated munduls, or punchayuts. With reference to late orders of government upon the subject of affording information, I beg leave to suggest the above plan, and should you approve of it I shall esteem it a favor if you will follow it up and oblige me with the result.

What I am anxious to obtain is a correct census of the present population, and the deaths and births for any short time previous to this period, so as to enable me to form an opinion of the comparative healthiness of this district, including the suburbs and the 24-Pergunnahs; and in ascertaining the number of deaths, it would be desirable to note down separately, those adults of the age of 16 and upwards, and of those below that age.

I have, &c.
(Signed) F. P. STRONG,
Surgeon to 24-Pergunnahs.

1*st. August*, 1837.

No. 12.—*Letter from Magistrate of 24-Pergunnahs.*

To F. P. STRONG, Esq.
Surgeon of the Zillah 24-Pergunnahs.

Sir,

I have the honor to acknowledge receipt of your letter dated the 1st instant. I have issued instructions with a view to obtain the information to which you refer, but I fear the result will

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not afford that minuteness of detail, or that accuracy you may consider desirable.

2. It is my object to ascertain as accurately as may be, the number of villages or hamlets in the district—then the number of houses in each village or hamlet, and by reckoning the number of inhabitants in each house within certain villages and in different parts of the district, a general average may be struck, which should give satisfactory data, though not so accurate as might be expected from a well organised system of statistical record.

3. As the inquiry proceeds, if it appear practicable, the minute enumeration of every individual of each pergunnah, and of the births and deaths, of a given period may also be attempted.

I have, &c.
(Signed) A. SCONCE,
Offg. Magistrate.

Zillah 24-Pergunnahs, the 7th Aug. 1837.

To F. P. STRONG, Esq.
Surgeon of the 24-Pergunnahs.

Sir,

To enable me to furnish the information respecting the health of the native population of this district during the last four months, required by the 3rd paragraph of Mr. Secretary Mangles' address to me dated the 8th instant, as noted in the margin*, I shall feel greatly obliged by your supplying me with any particulars on the subject that your professional duties may have put you in possession of.

I am, &c.
JOHN C. ERSKINE, *Offg. Collector.*

Collrs. Cutchy. 24-Pergunnahs,
The 17th August, 1837.

No. 13.—Letter to Collector on Public Health in the 24-Pergunnahs.

To the Honorable John C. ERSKINE,
Collector of the 24-Pergunnahs.

Sir,

I have the honor to acknowledge the receipt of your letter of the 19th instant, requesting my opinion as to the health of the native population of the district of the 24-Pergunnahs for the last four months. If we may consider the mortality among the

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* The state of health among the native population during the last four months, particularly specifying if the rates of mortality have been greatly above the average in any quarter.

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prisoners as affording data to estimate the mortality in the district. I should say that the last four months have not been unhealthy, when compared with the same months for preceding year. Among the prisoners for life confined in the Allipore jail, I find the mortality has been less than six per cent. per annum; while the mortality among the prisoners in the zillah jail, including those upon the roads in the suburbs, amounts to only a little more than four per cent. per annum, and among these were some who were returned in a dying state from the Burdwan roads.

From the reports I get from the native doctors stationed in different parts of the suburbs with the prisoners, and who assist in administering medicine to villagers when cholera prevails, I learn that there has not been much sickness in the suburb villages. As regards the interior of the 24-Pergunnahs, I am told by well informed persons with whom I often communicate, that although the population is wonderfully decreased since the inundation, yet, that the health of the people generally is rather better than usual, and that they look forward with better hope for good crops on their lands, since the rains commenced, than they did a fortnight ago, when they were much depressed by the extreme heat, and the fear and expectation of a bad harvest. Such I believe to be the honest state of things as far as a considerable part of the population are concerned; but it is admitted that there are some parts of the district where some of the tanks remain brackish, where the land has not quite recovered the effects of the inundation, and where the zemindars cannot induce rayats to locate.

I am unable to speak accurately as to mortality generally, but to show that I have endeavoured to obtain such information, I enclose you my letter to the magistrate, and that gentleman's answer thereto, written previous to your application to me, and with his assistance I shall be most happy if in future we should be able to ascertain these matters with some degree of certainty.

I have, &c.

(Signed) F. P. STRONG,

24th Aug. 1837. *Surgeon to 24-Pergunnahs.*

To R. MACAN, Esq.

Officiating Registrar of the Sudder Dewanny and Nizamut Adaulut.

SIR,

As I am endeavouring to make a table of the mortality of different sections of society, and as I have already succeeded in obtaining that of the Hindus and Mussulmans within the city of Calcutta for the last five years, and of the other communities for the last twenty years, and as I have ascertained the morta-

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lity among the prisoners within the Allipore jail, as well as those of the 24-Pergunnahs, for twenty years also; I am desirous if possible to ascertain what may have been the rate of mortality of the prisoners who were sent from the different Bengal zillahs to work upon the great roads, from the time they were first sent—(which if you have obtained answers from the circular you sent, similar to the one I received) you will see at one view.

As these are a class of prisoners peculiarly circumstanced, I may be able to judge how their health has been affected, as compared with those who have not been sent to so great a distance. When I am favored with the old medical returns to your court anterior to the year 1817, which I understand I shall obtain, I shall be able to make a comparison of the health of the prisoners before the great jail at Allipore was built, with their state since the erection of that capacious and airy building in which prisoners, entering often in advanced ages, and remaining there for life, present a mortality of 5¼ per cent. per annum; and with a view to carrying my investigation further I may add, as regards the general population of the district, that our magistrate is endeavouring to ascertain the census of the population, with the births and deaths of the Hindu, and Mussulman population. Should you have received answers to all your circulars upon this subject above alluded to, I shall esteem it a favor if you will obtain the sanction of the Court of Sudder Nizamut Adawlut to my being allowed the papers, or otherwise, a statement of such mortality occurring among the prisoners on the great trunk roads, from the time they were at first so employed, to the time of their being broken up and returned to their zillahs.

I have, &c.
(Signed) F. P. STRONG,
Surgeon to 24-Pergunnahs.

Calcutta, the 7th Sept. 1837.

APPENDIX.

No. 14/828.—*Letter of Committee of improvement in the Suburbs to Government, with their suggestions and advice.*

In acknowleding the receipt of your letter to us, enclosing an extract of a memorandum relative to the improvements of Entally and Tiljullah, I have the honor to request that you will convey to the Right Honorable the Governor General our thanks for the attention which he has given to our representation on the same subject, and our gratification at finding that the gentleman to whom our paper has been referred agrees in the necessity of some improvement taking place.

The improvements which that gentleman has suggested, are however upon a far more limited scale than those which we pointed out in our former paper, and which we still consider practicable, without putting the

Government to the great ultimate expense which that gentleman appears to think our plan will entail upon it. We therefore avail ourselves of the opportunity afforded us of making some observations upon both the plans.

The most obvious difference between them is, that that gentleman suggests merely the partial widening, straightening, and the paving, or as it is termed here, the making puckah, of the present roads, and the gradual making of public tanks, together with the cutting down of brushwood.

We are far from saying that even these would not be beneficial improvements, but we would observe that where these cannot be effected without interfering with private property, which would require to be purchased to make the roads straight and for the sites of tanks, and when done they would be but comparatively trifling improvements, while we respectfully submit that according to our plan, great and permanent improvement would be effected which would change for the better the face of the whole neighbourhood, and render it more healthy than it can possibly be so long as it is intersected by close and narrow lanes. We therefore consider that the opening of new and wide-roads, with here and there squares and public tanks, would be more preferable than only partial alterations in the present one. This latter measure may however be carried into effect without being incompatible with, but on the contrary, aiding the plan which we suggested.

We observe in an old regulation for Calcutta passed in the year 1780 but afterwards repealed, Sir Robert Chambers, and other then leading gentlemen, were appointed Commissioners for certain purposes connected with surveying, having roads, &c. made in Calcutta, and one clause of it so much supports our view of the nature of the roads that should be made, that we beg leave to refer to it. By the 15th clause the commissioners were to make and complete all such roads, passages, &c. as they should think necessary, to be forty feet in breadth except only the capital streets, to lead from the Baug Bazar bridge to the Esplanade, to be sixty feet in breadth, such roads as nearly as can be done, to run in parallel lines at two hundred yards distant from each other, and to vary such distance as they shall find expedient. That this scale of improvement was never generally carried into effect is evident, and the only place where this sort of plan has been effected is in the corner of the town to the south and south-east of the Shorts Bazar, which improvement we learn not only paid for itself, but yielded a profit of nearly two lacs of rupees. We are not so sanguine as to expect a similar profit, but we do look to the great probability of such surplus ground which might be purchased on the line of proposed new roads, paying, or nearly so, the whole expense of the improvement.

In our former paper we did not enter sufficiently into the detail of the particular improvements which we there mentioned, and our plan in that respect, and particularly as it regarded the proposed roads 60 feet in breadth from east to west, was, we must admit imperfect. And our not having pointed out more specifically the situations, and the parcels of property through which we thought the roads should pass, may have led the gentleman who wrote the memorandum which has been forwarded to us, to form a more general estimate of the price of the land which would be required, and the surplus of which might be available for sale than he would otherwise perhaps have done; and we would here beg leave to observe that we cannot concur in the opinion that Major Reny's property at Balleegunge affords a fair criterion of the general price of land upon the line of roads which we propose. There is indeed a great difference between the sort of houses and property at Balleegunge, and those at Entally, so much so, that we do not think that the one affords a good rule for estimating generally the value of the other. At Balleegunge, the houses are generally of a much larger description, and are surrounded with a far greater quantity of ground than those at Entally, where they are generally small, have only a few biggahs of ground attached to them, and are much closer together. The one may be called an increasing populous suburb of Calcutta, while the other has only a few houses situated in large gardens. It should also be considered that Entally is the nearest of all the parts of the suburbs, to that part of Calcutta in which business is carried on, while Balleegunge is near three times the distance. It is more than any thing owing to this proximity that Entally has become the place of residence of numerous persons having but moderate incomes, and the number of its European and East Indian inhabitants must considerably exceed that of any other division of the suburbs, whilst from the badness of the roads, the thickness of the jangal, and other similar causes it is perhaps the most unhealthy of the whole.

To return to the point of the value of the land, we believe from our inquiries that its price will in many situations, be found to be much higher than the average price contemplated by the gentleman who wrote the memorandum before referred to, while in many others it will be much lower. This as regards the proposed line of roads will be best explained by referring to the sketch or plan which we now send, on which is pointed out each parcel of property that we purpose should be purchased, with the price for which we think it could be obtained, and the quantity of land that would remain over for sale, the total result of which, calculating the surplus land to sell for rupees —— per cuttah would give Sicca Rupees —— towards reimbursing the expense of the part taken for the roads, tanks, &c. and the work upon them.

We come now to the subject of the house assessment, as to which, we fully concur in the opinion that "unless under the sanction of a law it would never be collected." But we are inclined to believe that when the specific purpose for which alone it would be applied becomes known, it would be collected with as little difficulty in Entally as we imagine it may be in Calcutta. We understand that the general Regulations of the Government are in force in all places beyond the limits of the Presidency, and it was upon this supposition, that we in our former representation suggested the formation of a Committee under the Regulation I. of 1824. If then, that Regulation, and other Regulations of the Government are in force in the suburbs, we conceived it possible for the Government (if they should deem it expedient) to pass a Regulation for levying an assessment on houses in the suburbs similar to that provided for by the 158th section of the Act of 33rd Geo. III. Chap. 52, modifying the Regulation according to the circumstances of the place where it would be in force.

The principal point in regard to the assessment is the amount which might be realized in the suburbs, taking the suburbs of Entally as an instance, including the East side of the Circular Road from that part on Major Schalch's map called, Havree Tullah, "at the head of the eastern nullah, and going southward to the part called Curriah Bazar," and running in a direct line eastward from those two points. The number of houses at present occupied by Europeans and East Indians is about ——. These houses may now be said to yield upon an average the monthly rent of Sicca Rupees ——; an assessment of Sicca Rupees —— per cent. upon this rental would yield Sicca Rupees —— per month, or Sicca Rupees —— per year. This sum after deducting the expense of collection applied annually in aid of repairs of the roads or (in the words of the act of Parliament) for and towards the repairing, watching, and cleaning, the streets, and for no other purpose, would go far towards, if it would not

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entirely, defray that expense, including also partial lighting. In making this estimate we consider that we are now taking the lowest rate, for, if new and good roads are opened, new houses will gradually spring up, and the assessment consequently rise in amount. Even in the present estimate we trust we have shewn that the "idea of raising funds sufficient to defray the expense of repairing, watching, and cleaning, the highways" of this part of the suburbs may be considered not altogether so "visionary" as the gentleman who has written the memorandum before alluded to, fears it must be. As we do not feel under the same apprehension, we respectfully hope that what we have now stated on this subject will totally change his opinion, should his Lordship refer our present statement to him, and in making this remark, we beg to be understood as by no means slighting, but on the contrary feeling grateful for his assistance in forwarding the views of improvement. We have confined our estimate of the assessment to that part only of the suburbs to which our proposed plan of improvement immediately refers, but we cannot omit observing that if a similar estimate was made of the rent of the whole of the suburbs, including of course, Garden Reach, Allipore, Bhawanipore, Cossieah Bagan, Balleegunge, Sealdah, &c. the per centage upon the rent would amount to a large sum, and would probably go far to keep all the roads in repair; those indeed at Garden Reach, and Allipore, are already excellent, though the houses are free from any assessment. In case the government should (as we believe it has the full power to do), pass a regulation for levying an assessment on houses for the purposes we have mentioned, we beg leave to offer a few observations as to the mode of collecting the tax. By the act of parliament before referred to, in force in Calcutta, the Justices of the Peace in their General, or quarter sessions, are impowered, for the purpose of defraying the expenses of watching and repairing the streets, "from time to time to make an equal assessment on the houses, or occupiers of houses, buildings and grounds, in the said town or factories respectively, according to the true and real annual value thereof, &c. and such assessment shall and may from time to time be levied, and collected, by such person or persons, and in such manner, as the said justices by their order in sessions shall direct and appoint in that behalf, and the money thereby raised shall be employed and disposed of according to the orders and directions of the said justices in sessions respectively for and towards the repairing, watching and cleaning of the said streets, and for no other purpose, and the assessments allowed under the hands and seals of such justices or any two or more of them may be levied by distress, &c. The principal alterations which it appears to us would be requisite in changing these enactments into a regulation for the suburbs, would be, the substitution of some other authority for the justices in session, and the actual collections could be made by "such person or persons, and in such manner as that authority should appoint." We should conceive that it would be with such person or persons so appointed that the detail would rest, and that the fittest mode of remuneration to him or them, would be by a per centage on the actual collections made, nor do we conceive that the details would be exceedingly multifarious, particularly if the collections be made only once a quarter. We are of course incompetent to state whether the magistrate of the suburbs, or the superintendant of the roads, would have leisure to perform the duty if the authority to be substituted for the justices in sessions were to be vested in them, but as it appears to us that all the detail which under the act of parliament falls upon the justices in Calcutta, is to be exercised by them only when holding their general or quarter sessions, we should not imagine that such detail can be very heavy, as the sessions are not very frequent, nor do we

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suppose that the duty of actually making the collections can be extremely heavy as that is performed by a gentleman filling another high and arduous situation. We do not imagine that there would be much, if any difficulty in finding among the inhabitants of the suburbs, persons who would undertake the collection of the assessment upon moderate terms, and the only detail that could at all fall heavy upon the person who in the proposed regulations might be substituted for the justices in sessions, would be the first fixing of the assessment, and some cases when the amount due is disputed, and some preliminary inquiry into those cases in which it might become necessary to levy the assessment by the mode to be provided, whether it be by distress, or other similar summary mode. These latter cases we do not consider would be very numerous, for when all saw that the money levied was expended in repairing and cleaning the roads, which they were daily obliged to pass, the generality of them would pay, not only without enforcement, but with cheerfulness.

The persons appointed to collect the assessment might have the duty divided amongst them by giving particular streets to each, and as a check upon them, they might not only be required to give security proportionate to the amount which would pass through their hands, but to assist the person who may be substituted for the justices in sessions in any detail which might fall upon them; and to keep the actual collector to a due exercise of vigilance, and to a proper correctness of his accounts it might be provided in the regulation that the accounts of the collection should be at stated periods, all submitted to a committee of the inhabitants, or to the inhabitants generally for their inspection, and that such a committee should have the power of examining and auditing them, without which they should not be deemed to be correct.

ART. VIII.—*Excision of two enormous Tumors from the Neck. By J. R. Martin, Esq. Surgeon to the Native Hospital.*

It was on the subject of tumors of the neck and throat, that John Bell made the following characteristic observation.

"It has often struck me that the things a surgeon ventures to do in the moment of operation resemble in one respect those which a soldier does in mounting a breach; what is past looks like a dream, and upon returning to the scene, and considering the danger that is over, he shudders at his hair-breadth escapes, and is conscious of having done what he can never venture to do again." I have within the last year excised two very large tumors situated exactly alike, along the neck, and deep seated under the angle of the jaw. They are operations "at once cruel and full of danger," yet also more full of humanity; for without them the man must die, they demand deep consideration beforehand and much caution in the actual performance.

I nearly lost my first patient under the knife, and afterwards from that sympathetic disease in the liver that occasionally follows the severer operations of surgery, and wounds of the head. The poor fellow came all the way from Ganjam to the Native